

HITACHI

8mm VIDEO CAMERA/RECORDER

VM-E54E



Instruction manual

page 2

To obtain the best performance and ensure years of trouble-free use, please read this instruction manual completely.

PRECAUTION

■ No water, dust or sand

Be careful that no water, dust or sand enters the camera/recorder because it may cause trouble and accidents.

■ Do not leave the viewfinder lens facing sunlight for a prolonged period, or the phosphorescent surface of the cathode ray tube may be damaged.

■ When you shoot at a scene which contains an extremely bright object such as the sun or a light source, a bright vertical bar may appear in the picture.

Your camera/recorder is functioning properly, but the solid-state pickup device (C.C.D) usually causes this as an inherent characteristic. Try to avoid shooting an excessive bright object directly.

MOISTURE

Avoid operating your camera/recorder immediately after moving it from a cold place to a warm, humid place. Give the camera/recorder 2 to 3 hours to stabilize in the ambient conditions of the surroundings before inserting a cassette. When moved from a cold place to a warm, humid place, moisture may condense on the head drum inside the machine. This moisture could cause the tape to stick to the headwheel and damage the headwheel or tape.

When a small amount of moisture is sensed, "TAPE" flashes in the viewfinder. Remove the cassette and set the OPERATE switch to OFF, then wait for about one hour.

BE SURE NOT TO LEAVE IT IN A PLACE AT HIGH TEMPERATURE EXCEEDING 50°C, OR ITS INTERNAL PARTS MAY DETERIORATE. BE CAREFUL NOT TO LEAVE THE UNIT IN THE FOLLOWING PLACES:

- * Inside a car with the window closed and in direct sunshine.
- * Near heating appliances.
- * In direct sunshine in summer.

NOTES:

- This unit uses 8mm video format cassettes.
- It records and plays back in the SP mode (20.05 mm/sec.).

This product is manufactured to comply with the radio interference requirements of EEC Directive 76/889/EEC, 82/499/EEC and 87/308/EEC.

WARNING: It is permissible to record television programmes only in the event that third party copyrights and other rights are not violated.

FEATURES

Single-Unit Convenience and Ease of Operation

Your video camera/recorder combines the functions of a video camera and a video tape recorder in one lightweight, easy-to-use instrument. This eliminates interconnecting cables and simplifies operation.

Record and Playback Capability

Record — Your camera/recorder can record directly from the built-in video camera.

Playback — Video/audio played back by the video recorder or fed directly from the camera may be viewed and heard on a TV receiver/monitor by using the AV output cord.

Digital Signal Processor

Programme AE (Auto Exposure)

The camera automatically determines the shutter speed and aperture according to the brightness of the subject.

Auto Focus Power Zoom Lens

The X12 autofocus zoom lens uses video auto focus system to automatically maintain focus and to allow you to zoom in and out for tele or wide angle shots at just the touch of the zoom button.

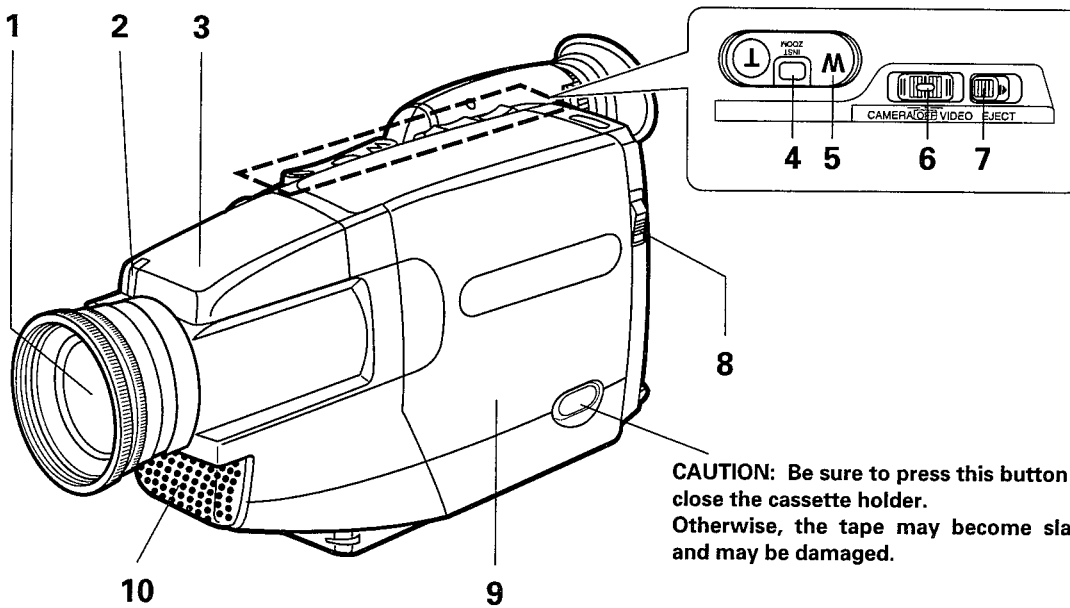
Digital Zoom up to X24

Smooth transitions from optical zoom to digital zoom.

Wireless Remote Controller is provided

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CAUTION: Be sure to press this button to close the cassette holder. Otherwise, the tape may become slack and may be damaged.

1. Lens

F1.8 (5 ~ 60 mm) X12 power zoom lens features with auto focus and auto iris functions.

2. Record Indicator

This indicator lights up to indicate that the camera/recorder is recording.

3. Infrared Ray Receiving Section

Receives infrared rays from the remote controller.

4. INST. ZOOM (Instant Zoom) Button

Use this button to magnify the image being recorded 1.5 times momentarily.

5. Power Zoom Switch

This switch performs zooming electrically.
 "W": Picture becomes wider gradually.
 "T": Picture becomes telescopic gradually.

6. OPERATE Switch

This turns the camera/recorder on and off and also switches between the camera and VTR modes. Set the switch to "CAMERA" to turn the camera's power on and to "VIDEO" to turn the VTR's power. Press and hold the small red button in the switch to switch it.

7. EJECT Switch

Operates with OPERATE either on or off, if a power source is connected to the camera/recorder.

8. BATT EJECT (Battery Eject) Lever

Releases the battery (provided), external power adapter (provided) or battery housing (optional) attached to the camera/recorder.

9. Cassette Holder

Slide EJECT switch to open the cassette holder. Be aware of the cassette direction when inserting.

NOTE: Power source must be connected to open the cassette holder.

10. Microphone

Sensitive to sounds coming from the direction in which the camera is pointed.

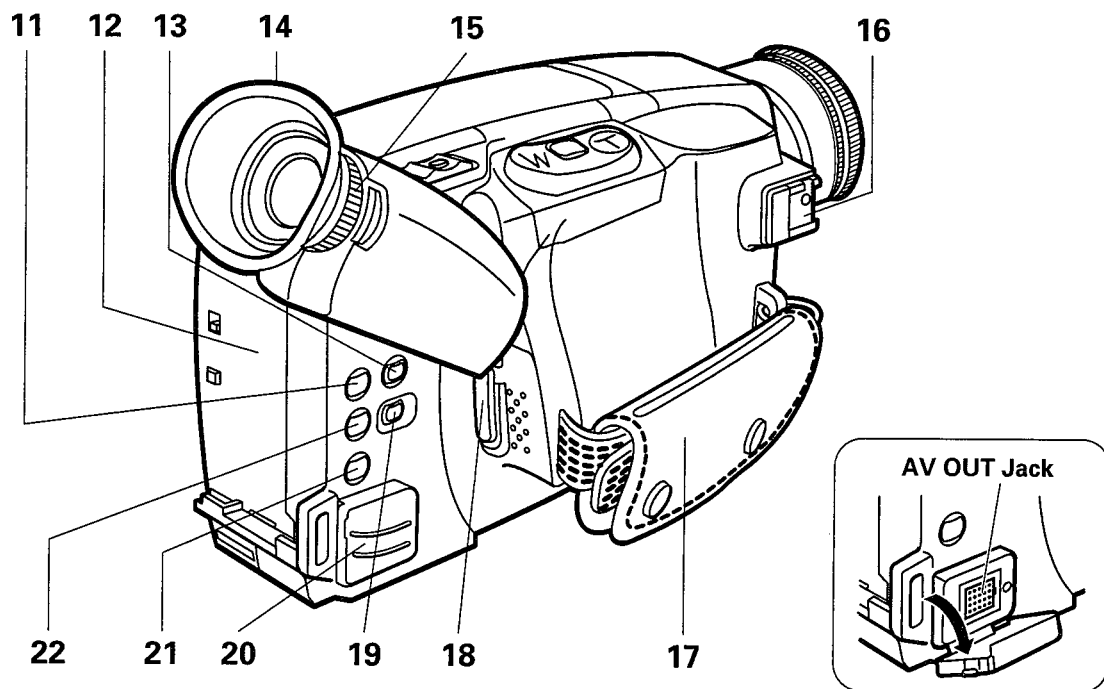
11. PLAY Button

Used for playback of tape.

NOTE: When the camera/recorder is in record/pause (stand-by) mode, pressing and holding this button will play the tape at normal.

12. Power Supply Attachment Section

Attach the battery (provided), external power adapter (provided) or battery housing (optional) here.



13. F.FWD Button

Press this button during stop or rewind mode, and fast-forwarding starts. Press the button during playback of tape, and the tape is played back in the forward direction approximately 7 times faster than the normal speed to confirm the recorded content. Press PLAY button to return to normal playback mode or press STOP button to stop tape movement. Also use F.FWD button when setting the date/time.

NOTE: You can also visually scan forward when the camera/recorder is in record/pause (stand-by) mode by pressing and holding this button.

14. Eye Cup

Pull out the eye cup all the way when using it and adjust the diopter control so that the subject is seen most clearly in the viewfinder.

Always push in the eye cup after use.

15. Diopter Control

To use the electronic viewfinder, turn this control for your optimum focus adjustment.

16. Camera Light Shoe

Used to attach the camera light.

17. Hand Strap

Adjust to best fit to your hand. (Refer to page 6)

18. Start/Stop Button

This button is used to control the camera/ recorder. When this button is pressed with the camera/ recorder set to the record/pause mode, the tape runs to start recording.

When this button is pressed again, the tape stops and the camera/recorder enters the record/pause (stand-by) mode. This button may be also used to display a still picture during playback mode.

19. REW/REVIEW Button

Press this button during stop or fast forward mode, and fast-rewinding starts. Press the button during playback of tape, and the tape is played back in the rewind direction approximately 5 times faster than the normal speed to confirm the recorded contents. Press PLAY button to return to normal playback mode or press STOP button to stop tape movement. Also use this button to review the last few seconds of the tape you are recording.

Use the REW/REVIEW button when setting the date/time.

NOTE: You can also visually scan backward when the camera/recorder is in record/pause (stand-by) mode by pressing and holding this button.

20. AV OUT Jack (Behind the door)

Use the AV output cord (provided) or RF output adapter (optional) to connect this jack to a TV to view the pictures played back by the camera/recorder.

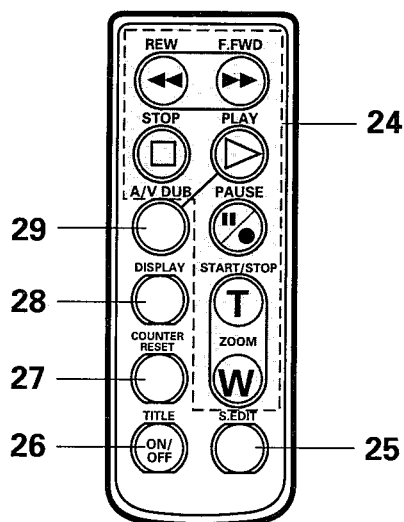
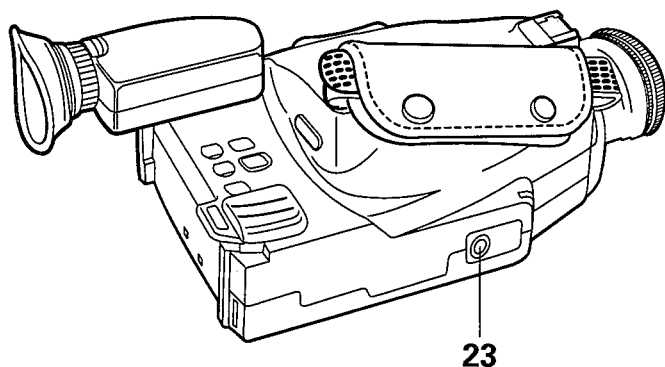
21. DATE Button

Press this button to display the date and time in the viewfinder. Whenever the date and time appear in the viewfinder, they will be recorded on the tape.

22. STOP Button

The STOP button is used to stop playback, rewind, and fast forward operations. The STOP button has no effect during record operation. Also use STOP button when setting the date/time.

CONTROLS AND FUNCTIONS



23. Tripod Mount Screw

Use this screw to mount the camera/recorder on a tripod (generally available).

24. Camera/Recorder Control Buttons

These shaded buttons on the remote control function the same as those on the camera/ recorder.

25. S.EDIT (Synchro Edit) Button (only on the remote controller)

Use this button to activate the synchro edit function for dubbing.

26. TITLE ON/OFF Button (only on the remote controller)

Use this button to store a title in memory or recall the stored title and record it superimposed on the picture being shot.

27. COUNTER RESET Button (only on the remote controller)

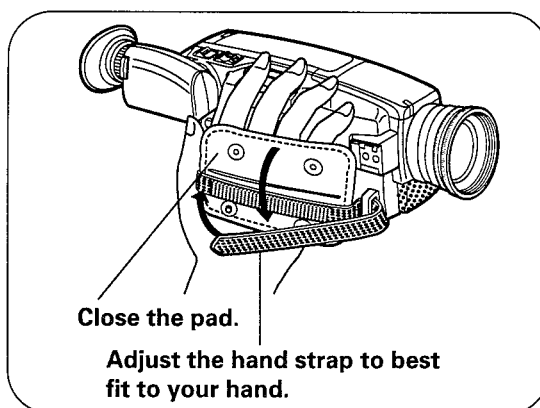
Press this button to reset the linear time counter in the viewfinder to "0:00:00".

28. DISPLAY Button (only on the remote controller)

Use this button to select the display in the viewfinder.

29. AV DUB Button (only on the remote controller)

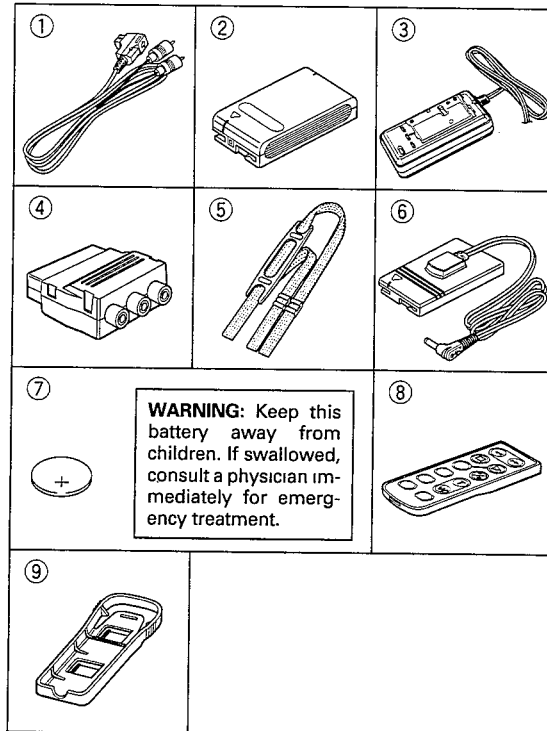
This button is used to record new audio and video in place of existing audio and video.



ACCESSORIES

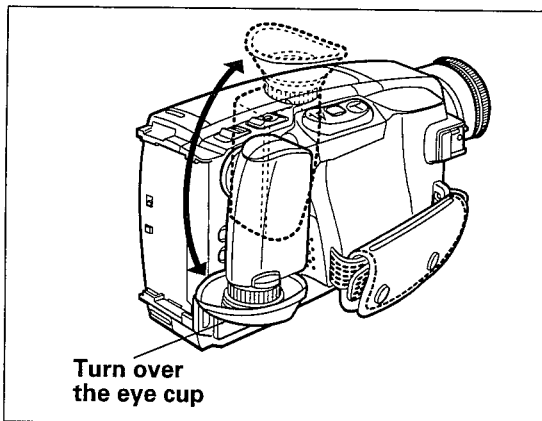
Check to make sure you have the following components and accessories (besides the camera/recorder unit itself) before disposing of the packing material.

1. AV Output Cord
2. Battery Pack
3. AC Adapter/Charger
4. AV Plug Adapter (Peri)
5. Shoulder Strap
6. External Power Adapter
7. Battery for Remote Controller CR2025
8. Remote Controller
9. Remote Controller Holder



ELECTRONIC VIEWFINDER POSITION ADJUSTMENT

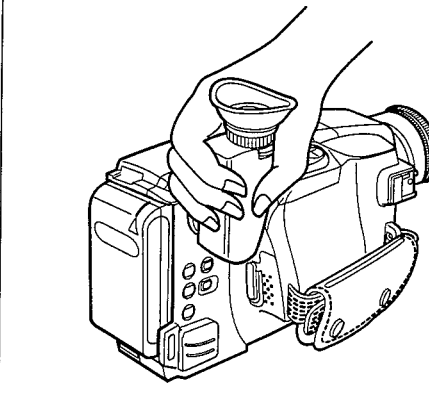
Adjust the electronic viewfinder to a position where you can see through it easily.



NOTE: Put the viewfinder back to original position when storing the camera/recorder into the carrying case or carrying the camera/recorder.

CAUTION:

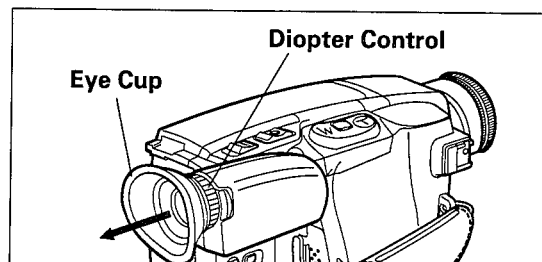
Do not hold the unit by the electronic viewfinder when carrying as this could cause a malfunction.



EYEPiece ADJUSTMENT

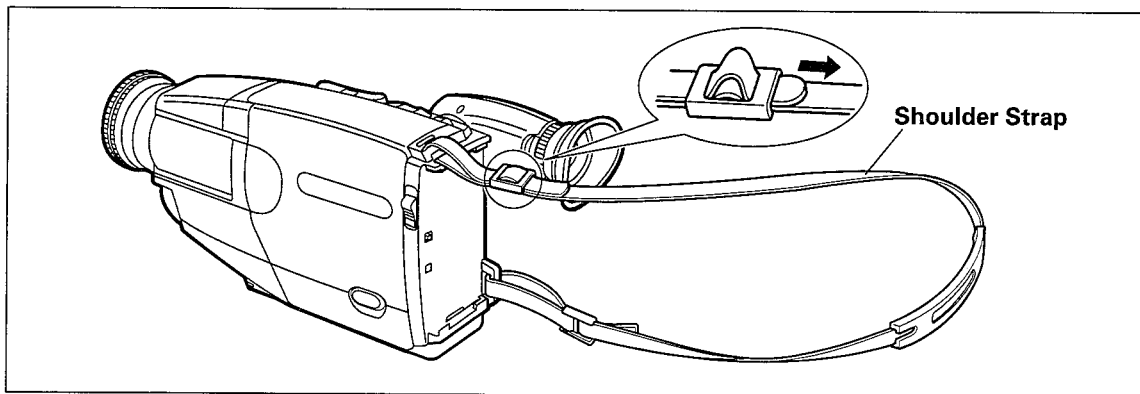
To use the electronic viewfinder, pull out the eye cup all the way and adjust the diopter control so the display in the viewfinder can be seen most clearly.

Always push in the eye cup after use.



HOW TO INSTALL THE SHOULDER STRAP

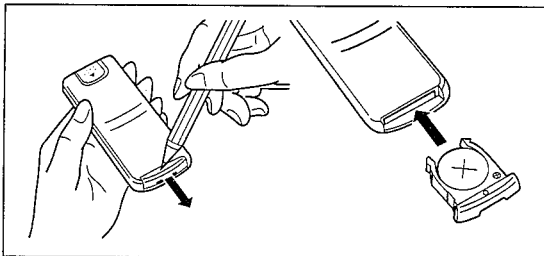
Attach the shoulder strap as illustrated below.



LOADING A BATTERY FOR REMOTE CONTROLLER

You may want to install the remote controller battery (provided) immediately to prevent losing it.

1. Pull the battery holder from the remote controller (provided).
2. Place the battery as illustrated, and then attach the holder to the remote control.



NOTE: When replacing the batteries, use 3V micro lithium battery Maxell CR2025.

This product uses a lithium battery which contains dangerous chemicals. Handle and dispose of with great care.

WARNING

- Do not throw in a fire.
- Do not short circuit it.
- Do not disassemble it.
- After use please bring back to retail shop.

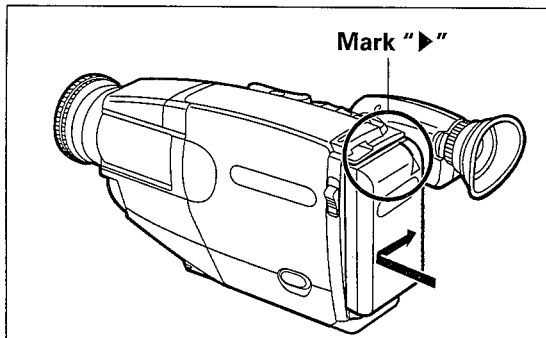
POWER SOURCES

NOTE: Be sure to turn off power of the camera/recorder when attaching or detaching a power supply (battery, AC adapter/charger, etc.) to the camera/recorder.

■ WHEN USING WITH THE BATTERY (provided)

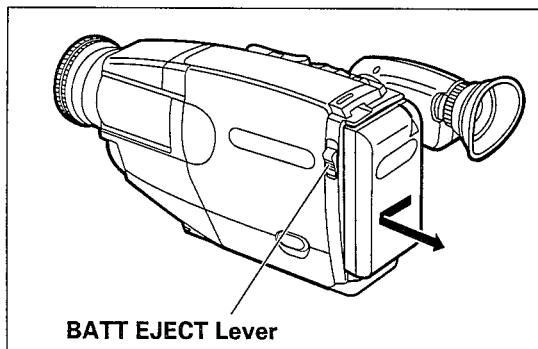
NOTE: The battery must be charged before it can be used for the first time. Refer to "CHARGING THE BATTERY" on page 11.

1. To attach the battery, align the "▶" mark on the battery with that of the camera/recorder.
2. Hold the battery flush against the camera/recorder and slide it in the direction of the arrow.



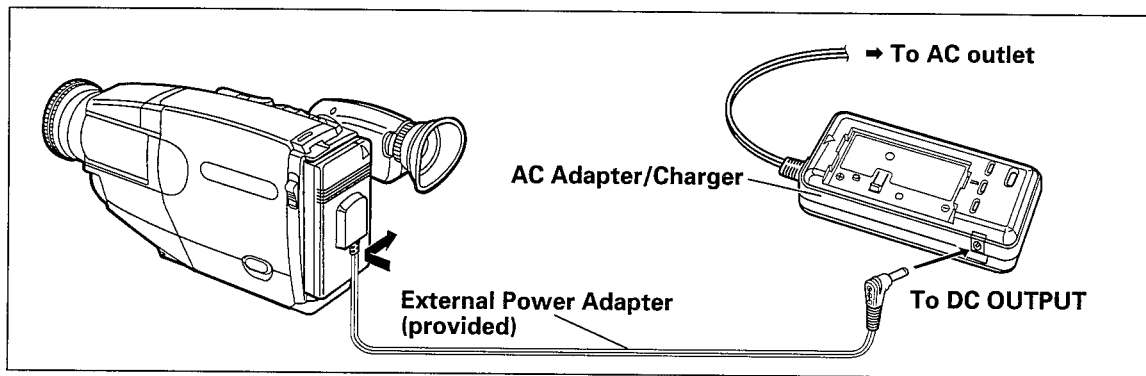
■ To remove the battery

Push and hold BATT EJECT lever, then slide the battery to the left and remove.



NOTE: Always remove the battery from the camera/recorder after use.

■ WHEN USING WITH THE AC ADAPTER/CHARGER (provided)



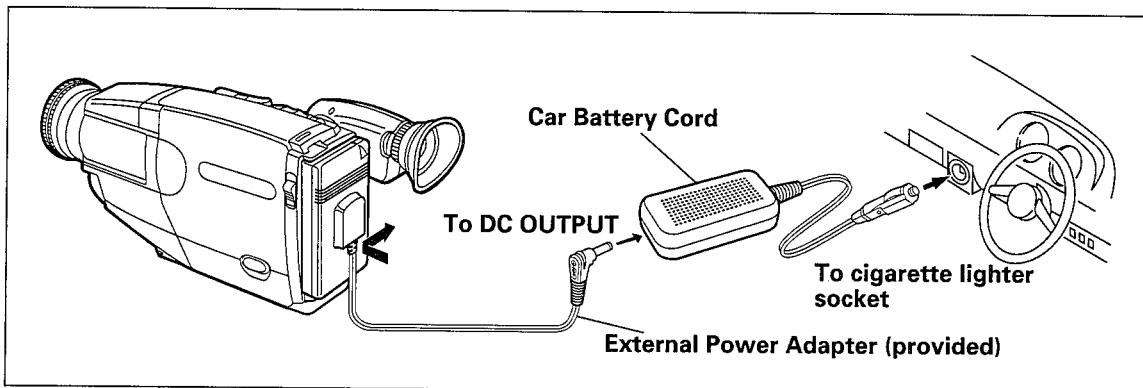
1. Attach the external power adapter (provided) to the camera/recorder as shown in the figure. Align the marks and hold the external power adapter flush against the camera/recorder then attach it using the same procedure used when attaching the battery.
2. Connect the external power adapter plug to the DC OUTPUT jack of the AC adapter/charger.
3. Plug the AC adapter/charger power cord into an AC electrical outlet; the POWER indicator on the AC adapter/charger will come on.
4. To remove the external power adapter from the camera/recorder, perform the same procedure as when removing the battery.

See the bottom of the AC adapter/charger. The rating label is located on the bottom of the AC adapter/charger.

NOTES:

- This AC adapter/charger is universal for use with AC 110 — 240V around the world. If you use the camera/recorder in some foreign countries, an AC plug adapter (Not supplied) may be necessary.
- When using the AC adapter/charger to power the camera/recorder, the battery level indicator may display "■". This indicator is used for battery operation and has no meaning when using the AC adapter/charger to power the camera/ recorder.
- The AC adapter/charger cannot charge the battery and operate the camera/recorder at the same time.
Remove the battery from the AC adapter/charger to supply power to the camera/ recorder.

■ WHEN USING WITH THE CAR BATTERY (By using optional car battery cord)

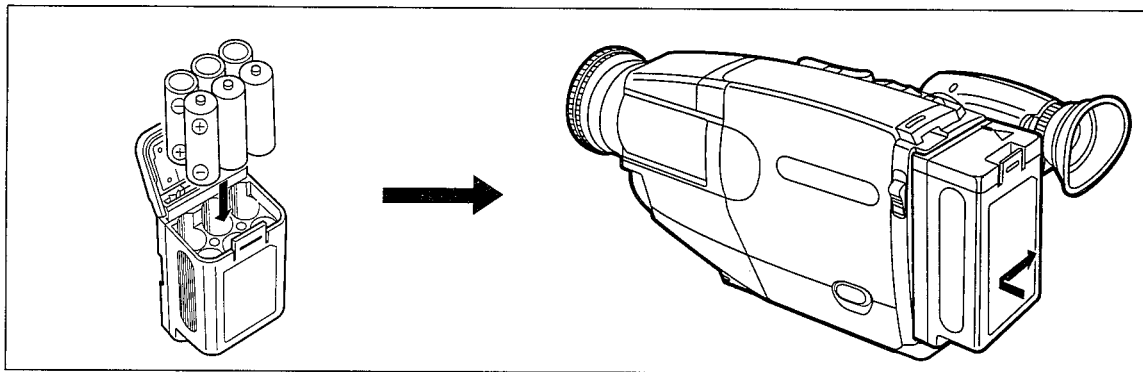


1. Connect the external power adapter (provided) to the camera/recorder, as illustrated.
 - Attach it by the same procedure as when attaching the battery.
2. Connect the small plug of the external power adapter to DC OUTPUT of the car battery cord.
3. Connect the car battery cord to the car's cigarette lighter socket.

NOTES:

- The car battery cord is designed to be used only with automobiles having a 12/24-volt negative ground system.
- To prevent fire or shock hazard or damage to your camera/recorder, use only the specified car battery cord.

■ WHEN USING WITH THE BATTERY HOUSING (Using the optional Alkaline Battery Housing)



1. Insert six "IEC R6" alkaline dry-cell batteries as shown.
2. Attach the battery housing to the camera/recorder as shown in the figure.
 - Align the "▶" marks and hold the housing flush against the camera/recorder, using the same procedure as when attaching the battery.

NOTES:

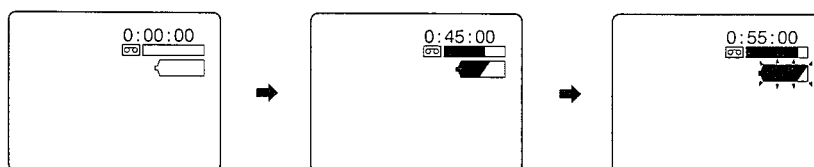
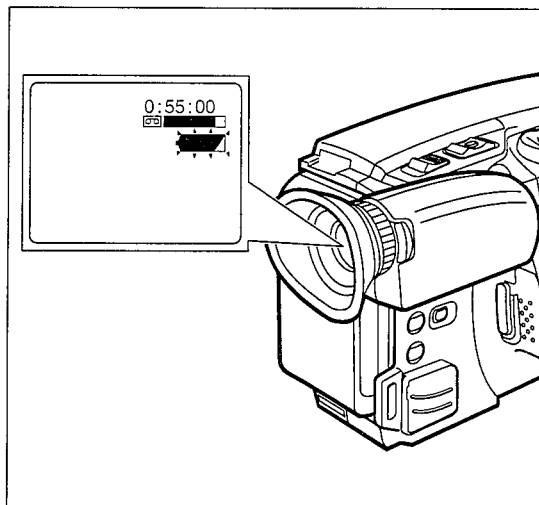
- Attach the battery case immediately before you start recording.
- The operation time with the battery housing depends on the type of the batteries used and the way you use the camera/recorder.
- Remove the battery housing from the camera/recorder by the same procedure as when removing the battery.
- The battery housing cannot be used in cold places.
- Ordinary manganese batteries cannot be used.

CHECKING THE BATTERY PACK

When the "■" indication in the electronic viewfinder appears and flashes while the video camera/recorder is operated with a battery pack (provided) or an alkaline battery housing (optional), it indicates that the battery charge is insufficient. Charge it or replace it with a charged battery pack.

NOTE: When the camera/recorder is turned on, the battery level indicator "□" is displayed in the viewfinder indicating the condition of camera/recording battery. When the battery is fully charged, "□" is displayed.

After several minutes, the symbol will change to "▣". When the battery is very near empty, the symbol will change to "■" and start blinking. You should find an alternative power source or recharge the battery before continuing to use your camera/recorder.



CHARGING THE BATTERY

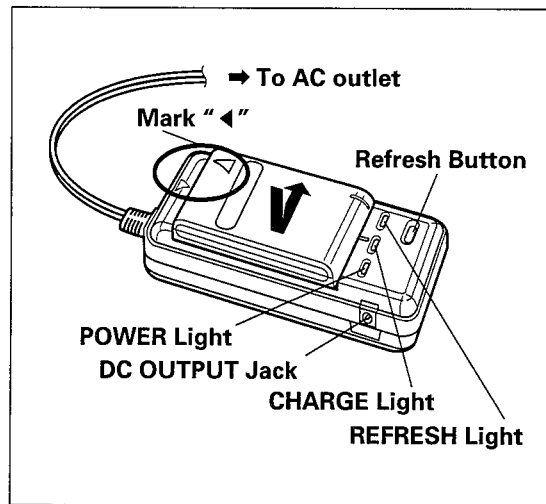
1. Plug the AC adapter/charger power cord into AC electrical outlet.
2. Attach the battery to the AC adapter/charger. Align the "◀" mark on the battery with that of AC adapter/charger and push the battery flush with the AC adapter/charger and slide it in the direction of the arrow as shown in the figure.

NOTE: You must remove the external power adapter from the AC adapter/charger to charge the battery. If the external power adapter is connected, CHARGE light will flash.


3. The CHARGE light will be lit while the battery is accepting a charge, and will go out when the battery is fully charged.

NOTE: If you repeatedly charge a battery which is not completely discharged or leave a battery unused for a long time, the operation time of the battery will become shorter even when it is completely charged. In this event it is recommended that you refresh the battery before charging it.

Attach the battery and then press the refresh button to refresh it. When refreshing is complete, the CHARGE indicator will light in place of the REFRESH indicator and charging will start automatically.



To prolong the life of Ni-Cd batteries

- Only re-charge batteries when they have completely discharged and the warning light () is flashing.
- DO NOT top-up charge on batteries.

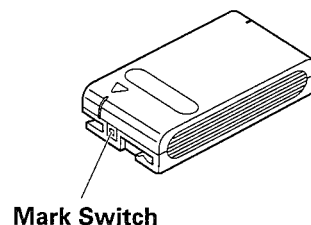
NOTES:

1. The time required for charging the battery is approx. one hour (VM-BP82G).
2. When fully charged, the battery should supply approx. 55 ~ 65 minutes of operating time (depending on how much you use zoom and pause).
3. An optional long play battery (VM-BP83) may also be charged by the AC adapter/charger. The time for battery charging is approx. two hours.
4. It takes about 4 hours to refresh a fully charged battery (VM-BP82G).
5. Charge the battery before use and store it at normal room temperature.
6. The battery should be charged at a temperature of 10°C – 30°C to prevent damage.
7. Do not operate the battery at temperatures below – 10°C or above 35°C. The battery may be damaged if operated at temperatures above 50°C. Operation time will decrease at extremely low temperatures.
8. After repeated chargings and use, the operation time will gradually decrease. When operation time becomes too short to be useful, it is time to replace the battery.
9. If the POWER light on the AC adapter/charger starts flashing, remove the battery and then reattach it. If after several attempts the POWER light continues to flash, this means your battery cannot take a charge and must be replaced with a new one.

The POWER light will also flash if a hot battery is attached to the AC adapter/charger. Attaching an extremely hot battery to the AC adapter/charger is not recommended; it should be allowed to cool down before being attached.

10. Do not short the battery's terminal.
11. Do not attempt to disassemble or modify the battery. There are no user serviceable parts inside.
12. Throwing the battery into a fire or exposing the battery to excessive heat – over 65°C could be hazardous.
13. Set the mark switch of any battery which has already been charged to red as shown in the figure. This lets you discriminate between charged and uncharged batteries easily.

NOTE: The mark switch is not concerned with the battery's performance.

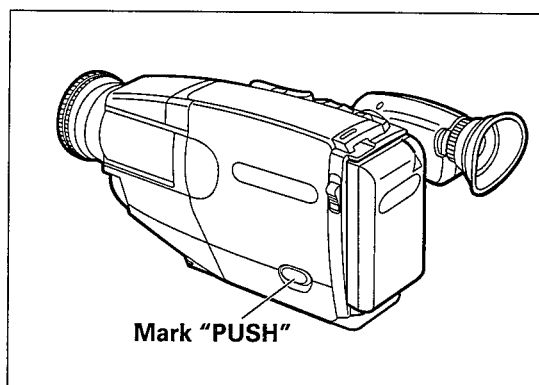
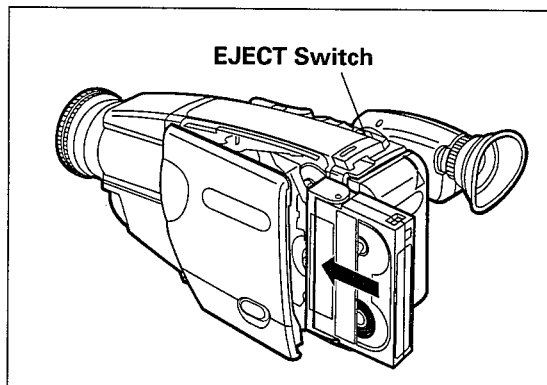


INSERTION AND REMOVAL OF CASSETTES

Before inserting or removing a cassette, be sure to connect the power source. When a power source is connected, the cassette can be ejected and removed whether the power is on or off.

■ Insertion

1. Slide the EJECT switch.
The cassette door will open.
2. Insert a cassette so the transparent window is toward you and the arrow toward the cassette holder. Slide the cassette into cassette holder as far as it will go.



NOTE: If TAPE flashes in the viewfinder, remove the cassette and check that the tape is not damaged, is not slack or no dust adheres to it, etc. After making sure that there is no abnormality, reinsert the cassette. If TAPE reappears, see "TROUBLESHOOTING" on page 31.

■ Removal

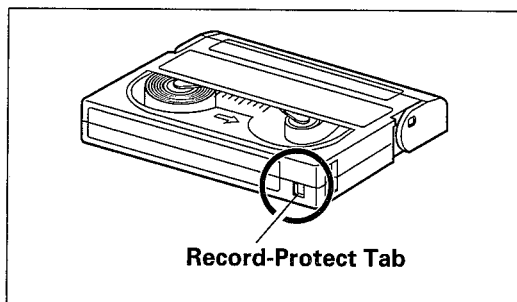
Slide the EJECT switch and remove the cassette.

3. Press the cassette holder.
Push the section of the holder marked "PUSH" until a click is heard.

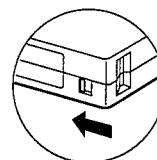
Be sure that you push the cassette holder marked "PUSH" to close the holder. Otherwise, the holder will not close and the tape may become slack which could lead to damage.

8mm Video Cassette

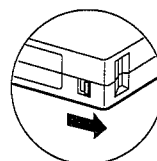
An 8mm Video Cassette has a record-protect tab on the side of the cassette that can be slid to prevent accidental erasure of recorded material.



To prevent accidental erasure, slide the record-protect tab in the direction of the arrow until the tab is completely visible.

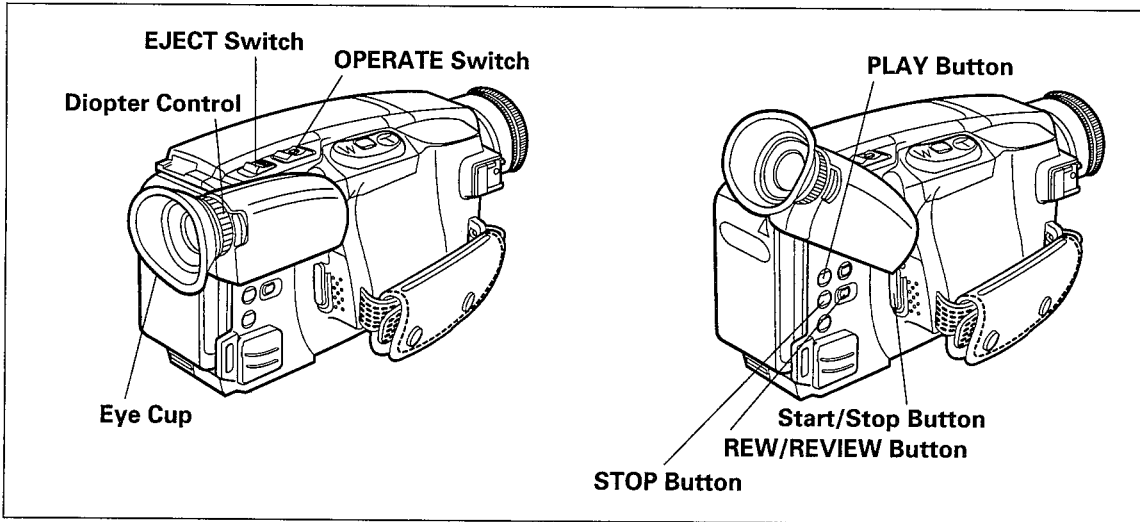


To record on the cassette again, slide the record-protect tab in the direction of the arrow. The tab will disappear behind the cassette case.



NOTE: After unpacking, it is recommended to fast forward tape to its middle and then rewind it before recording with the camera for the first time.

CAMERA RECORDING



1. Connect either one of the "POWER SOURCES" on pages 8 through 10.

2. Slide EJECT switch and insert the cassette.

NOTE: If the power source is not connected to camera/recorder, the cassette holder will not open.

3. Press the cassette holder. The holder will latch in the operating position.

4. Slide OPERATE switch to "CAMERA". "II" appears and the camera/recorder will enter record/pause mode automatically.

NOTE: If the record-protect tab on the cassette is closed, the "TAPE" indication in the viewfinder flashes for several seconds and the camera/recorder will not enter record/pause mode.

5. Pull out the eye cup all the way and adjust the diopter control so the display in the viewfinder can be seen most clearly.

6. Now, press Start/stop button to start shooting the picture. You are now recording the picture you see through the electronic viewfinder. The "REC" indication appears in the electronic viewfinder instead of "II".

7. Press Start/stop button to stop recording. Press the button again to resume recording. The "II" indication appears in the viewfinder instead of "REC" in the record/pause (stand-by) mode.

NOTES:

- The "TAPE END" indication in the viewfinder starts flashing when there is about three minutes recording time left on the cassette.

- If the record/pause mode continues for more than 5 minutes, the camera/recorder's power is automatically turned off. To turn on again, press Start/stop button. The camera/recorder enters record/pause (stand-by) mode.

8. After recording, slide OPERATE switch to "VIDEO", and the camera/recorder will be now in the stop mode.

9. Press REW/REVIEW button. The tape will be rewound to the beginning.

10. Press PLAY button. The picture you just recorded will be seen through the viewfinder.

NOTE: If you connect the camera/recorder to your TV, you can see the picture played back on your TV. Refer to "CONNECTIONS AND OPERATIONS FOR VIEWING THE PICTURE PLAYED BACK ON YOUR TV" on page 25.

11. After playing, press STOP button.

12. Slide OPERATE switch to "OFF" and then slide EJECT switch to remove cassette.

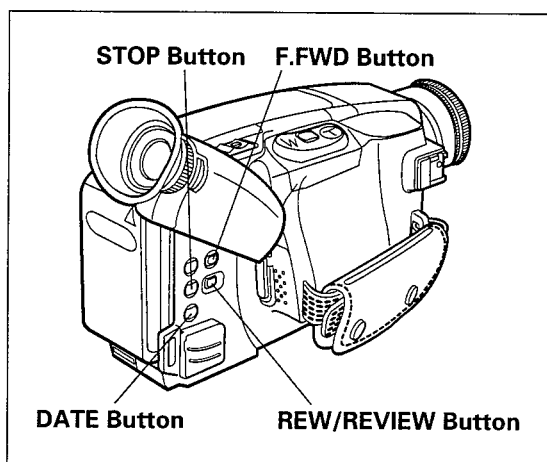
13. Always remove the power source from the camera/recorder after use.

NOTE: If you have a cassette tape that has already been partially recorded on and you want to record the remaining blank section, see "QUICK EDIT" on page 19.

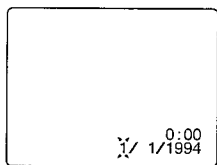
DATE/TIME SETTING

The date and time can be recorded on your tapes to act as a handy reference when viewing them at a later time. Use the following procedure to set up this display for the current date and time. The time backup battery is rechargeable. Charge the backup battery every two months. Set the OPERATE switch to OFF and connect a charged battery or AC adapter/charger to the camera/recorder for 24 hours. Make sure that the current time is displayed correctly before you start recording.

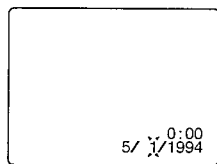
NOTE: The backup battery should be charged every two months. If it is not charged periodically, it will be over-discharged and its life will be shortened.



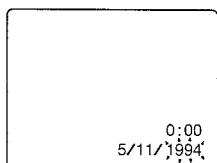
1. Slide the OPERATE switch to "CAMERA" while holding the small red button in the OPERATE switch down.
2. Press DATE button. "0:00" and "1/1/1994" appears in the viewfinder and "1" flashes.



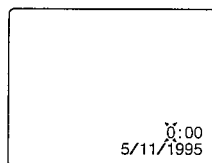
3. Press F.FWD button to select correct date. Hold button down to advance rapidly. If you go past the date you want to set, press REW/REVIEW button. When the correct date appears, press STOP button.



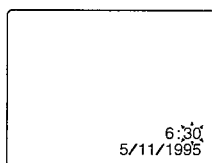
4. Press F.FWD button to select correct month. Hold button down to advance rapidly. If you go past the month you want to set, press REW/REVIEW button. When the correct month appears, press STOP button.



5. Press F.FWD or REW/REVIEW button to select year, and then press STOP button.



6. Press F.FWD or REW/REVIEW button to select correct hour, and then press STOP button.
7. Press F.FWD or REW/REVIEW button to select correct minute.



8. After setting to the correct minute, press DATE button to change the display and start the internal clock.

It is recommended that you press the DATE button to match the time signal.

■ To correct date/time after starting the date/time

1. Press and hold DATE button, and then press STOP button. The date starts flashing.
2. Correct the incorrect digit by using F.FWD, REW/REVIEW and STOP buttons.

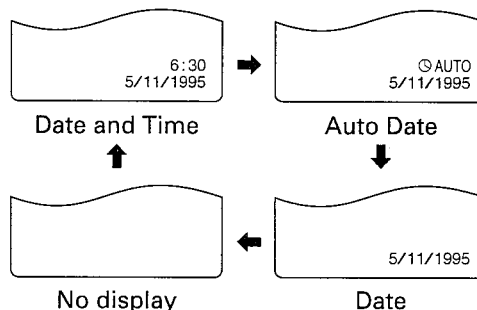
■ To correct date/time during programming

1. Press STOP button repeatedly until the digit that is incorrect flashes.
2. Correct the incorrect digit by using F.FWD, REW/REVIEW and STOP buttons.

■ To record date/time graphics

Press DATE button repeatedly to select the required date/time graphics in the viewfinder, then start recording.

- The display changes in the following order each time DATE button is pressed.

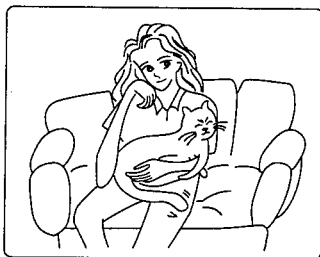


NOTE: Refer to "AUTOMATIC DATE RECORDING" on page 18 for recording the date only once a day.

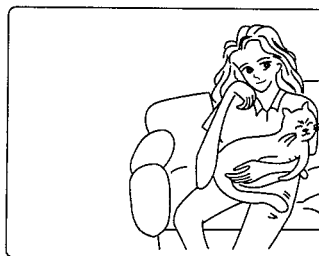
AUTO FOCUS

- You can always focus the object automatically.

- The object at the center of the viewfinder is in focus.



Good



No good

The range of object with which auto focus can be used

- On "T" side: about 1.1m from the lens surface to infinity.
- On "W" side: about 3 cm from the lens surface to infinity.

■ You cannot focus automatically with the following objects.



1. Objects not in the center of the viewfinder.



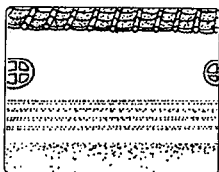
2. Objects at far and near positions at the same time.



3. Objects lit by a spotlight or neon signs, etc.



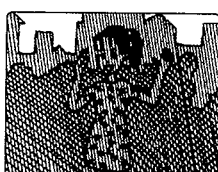
4. Objects behind glass with water droplets or dust on it.



5. Objects with almost no difference in brightness such as a white wall.



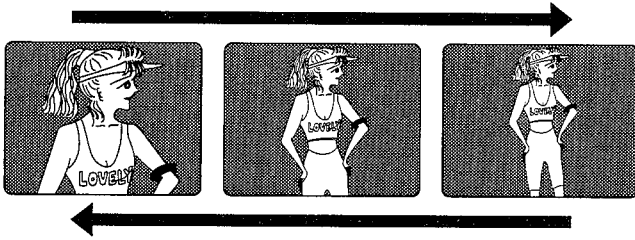
6. Objects moving rapidly.



7. Dark objects

POWER ZOOM

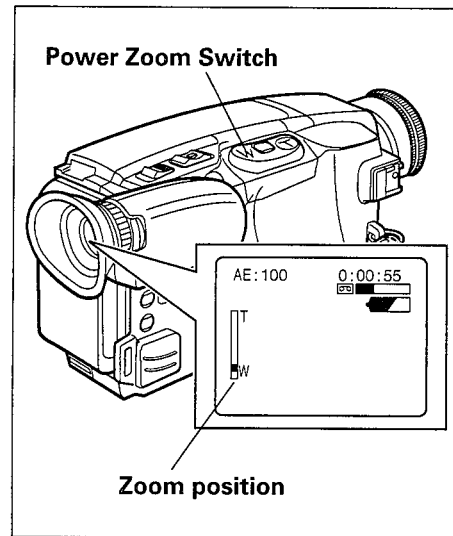
- Press power zoom switch on the "W" side, and the picture gradually widens.



- Press power zoom switch on the "T" side, and the picture gradually becomes telescopic.

NOTES:

- If "ZOOM" appears in the viewfinder, the digital zoom function is engaged.
- When the power zoom switch is operated, the zoom position is displayed in the viewfinder for about 5 seconds and then disappears. The zoom position is displayed in 10 steps.

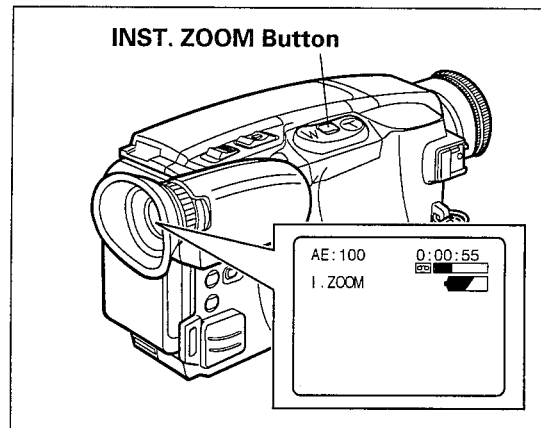


INSTANT ZOOM

The instant zoom feature activates the digital zoom to magnify the subject being recorded 1.5 times momentarily regardless of the zooming engaged by the power zoom switch.

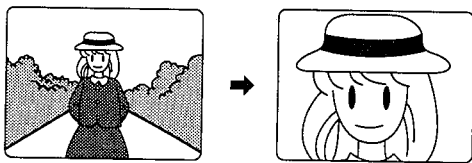
Press the INST. ZOOM button. "I.ZOOM" appears in the viewfinder and the subject is magnified 1.5 times. The instant zoom function only operates when "I.ZOOM" is displayed. To release instant zoom, press the INST. ZOOM button again so that "I.ZOOM" disappears from the viewfinder.

NOTE: When the instant zoom is used, the more the image is magnified, the rougher the picture becomes. Also even a slight shaking of the camera/recorder is conspicuous.



DIGITAL ZOOM

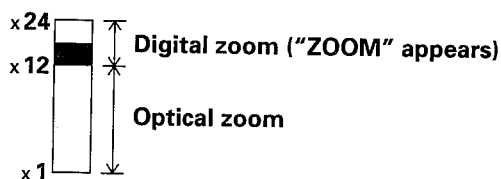
This feature allows you to increase the magnification of the image at the center of the screen up to 2 times greater than the extreme telephoto position.



Press the "T" side of the power zoom switch and hold it; "ZOOM" appears in the viewfinder and the digital zoom function is engaged.

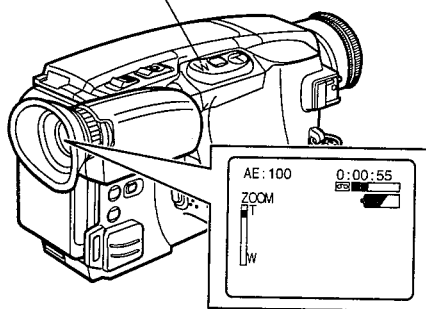
NOTE: The digital zoom functions from the extremely telephoto position of X12.

• Zoom area



You can control the digital enlargement ratio by pressing the "T" or "W" side of the power zoom switch. When "ZOOM" is not displayed in the viewfinder, the normal zooming function is restored.

Power Zoom Switch



BEFORE YOU START TAKING PICTURES WITH YOUR DIGITAL ZOOM CAMERA/RECORDER

Digital zoom lets you really get close to the action. Due to the unique nature of this feature here are some important points to consider before you start:

As with all digital zoom camera/recorders picture clarity diminishes at high zoom ratios.

When you zoom in on your subject, at some point camera shake will become noticeable. As the zoom ratio becomes high, it is better to use a tripod.

Since no two people will use their camera/recorders in exactly the same way, you should test the digital zoom feature by making a brief test tape at various zoom settings. So get comfortable with your new camera/recorder then go out and get close to the action.

MACRO

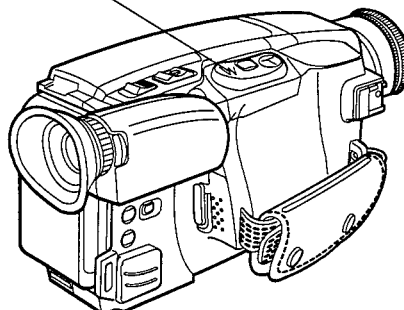
It permits you to shoot objects as close as 3 cm from the lens tip.

Press and hold "W" side of power zoom switch. An object is auto focused.

NOTES:

- Determine the size of the object by moving the camera backward and forward.
- Be careful as the lighting tends to be low when shooting in the above conditions.
- A subject 1.1m from the lens surface to infinity can be focused on the telephoto side.


Power Zoom Switch (W)

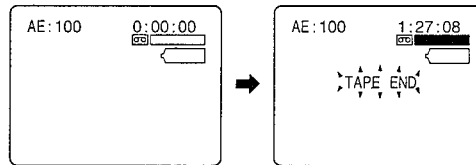


REMAINING TAPE

The tape remaining display shows the remaining tape that can be used for recording and playback in the viewfinder using bars.

Insert a cassette into the camera/recorder;

" - - - - -" appears in the viewfinder. 10 seconds after recording or playback is started, the remaining tape will be displayed. The display will appear when a cassette is loaded, and it will disappear when the cassette is ejected.




NOTES:


- The maximum tape remaining is displayed by the 7 bars as shown below regardless of the recording time of the cassette being used. The remaining tape per bar is different for different cassettes.
- The tape remaining display appears 10 seconds after the tape starts to run.
- The "TAPE END" indication in the viewfinder starts flashing when there is about three minutes recording time left on the cassette.

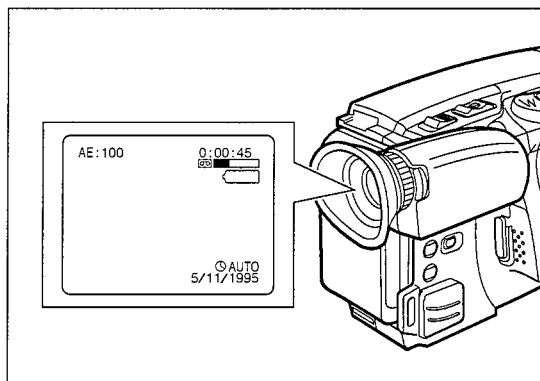
AUTOMATIC DATE RECORDING

This feature records the date automatically once a day. After you begin recording, the date is recorded automatically for 10 seconds. The same date is recorded again in the following cases.

- When the cassette is replaced
- When " AUTO" is displayed again after being switched to the date display.
- When the recording is for less than 10 seconds

If the date changes while recording continues over 10 seconds, the date is recorded for 10 seconds when recording is restarted after the camera/recorder has been set to the standby mode.

Press the DATE button until " AUTO" and the date appear in the viewfinder before you begin to record. The date will be recorded whenever it appears in the viewfinder.

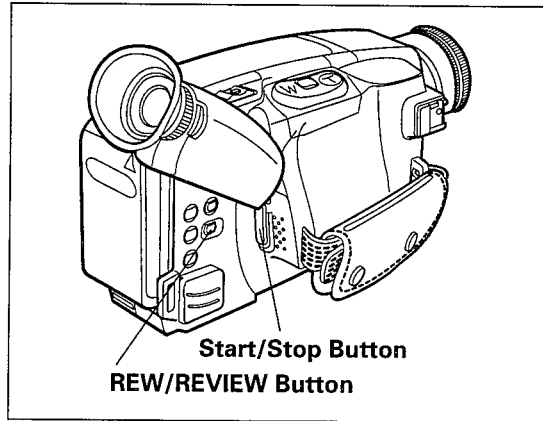


PROGRAMME AE (Auto Exposure)

Programme AE automatically selects the shutter speed 1/50, 1/100, 1/150, 1/250, 1/350, 1/500, 1/750, 1/1000, 1/1500, 1/2000 or 1/4000 second that is optimum for the brightness of the subject. The iris is also adjusted automatically in response to the shutter speed.

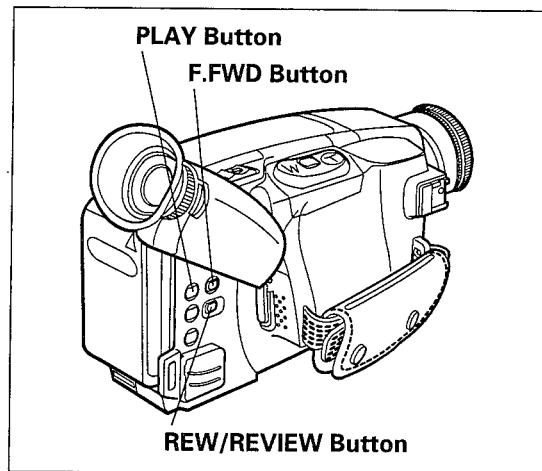
INSTANT REVIEW

1. In record/pause (stand by) mode, tap REW/REVIEW button, and the recorded scene of the last few seconds is played back in the reverse direction and then played back in the forward direction.
2. When the tape reaches the end of the scene you have just recorded, the camera/recorder returns to the record/pause (stand by) mode. Recording starts again when the Start/stop button is pressed again.



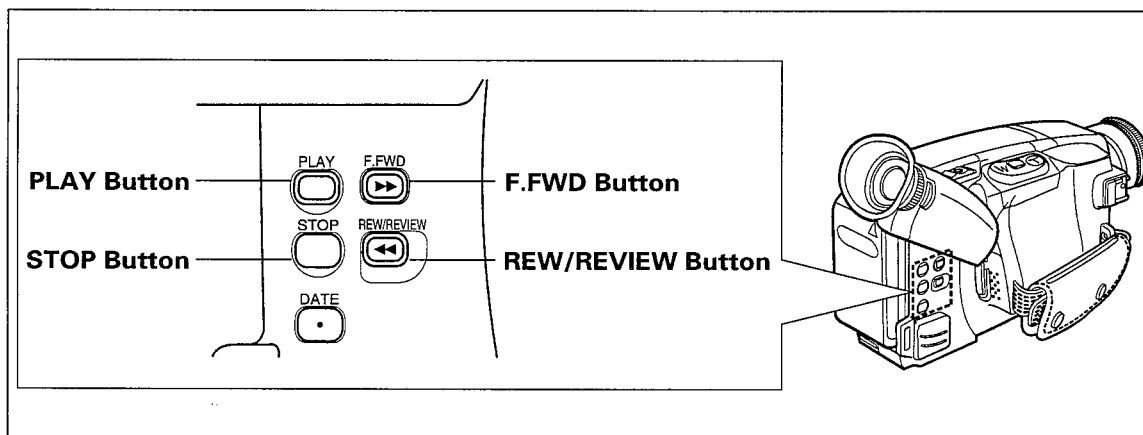
QUICK EDIT

The quick edit feature allows you to search for the end of previously recorded material, or find a particular spot on your tape, to begin your editing, or recording new material. Quick edit is used while the camera/recorder is in the record/pause (stand-by) mode. By holding down the F.FWD, REW/REVIEW, or PLAY button you can visually search or play your tape. Releasing the buttons (F.FWD, REW/REVIEW, or PLAY) immediately stops the tape at that position.



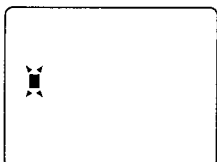
TITLE RECORDING

You can easily create and record personalized titles on your videos with the camera/recorder's built-in titler. The titler will store 2 different title pages in memory. Once a title is stored, it can be displayed and recorded at anytime. Each title page can contain two lines of 16 characters each. The character contains 47 different characters for creating titles.



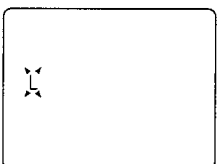
■ Creating a title

1. Press TITLE ON/OFF button on the remote controller. The flashing cursor will appear in the viewfinder.

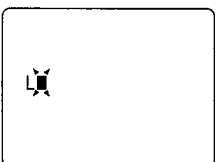


2. Press STOP button repeatedly to move the flashing cursor to the place you want to begin your title.
3. Select the first character for your title by pressing the REW/REVIEW or F.FWD button repeatedly until the desired character appears.

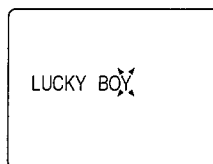
NOTE: Each title can contain up to two lines of 16 characters each. A chart showing the characters contained in the registers is located on page 21.



4. After you have selected the first character, press STOP button to move the flashing cursor to the place you want the next character.



5. Repeat steps 3 and 4 until you have completed the title.



NOTE: Character may flash, however it will be recorded correctly without flashing.

6. After completing your title, press PLAY button and create the title on another title page as required.
7. After creating the title, press TITLE ON/OFF button on the remote controller to remove the title graphics from the viewfinder. Now title graphics is stored in memory.

NOTE: As long as the correct current time can be displayed, the tile is held in memory.

■ Correcting errors during programming

1. Press STOP button repeatedly until the character to be corrected flashes.
2. Press either REW/REVIEW or F.FWD button until the correct character appears.

NOTE: The corrected character may flash, however it will be recorded correctly without flashing.

■ **Recording titles on a tape in the camera/recorder**

1. Slide OPERATE switch to "VIDEO".
2. Locate the position on the tape that you wish to record the title.
3. Slide OPERATE switch to "CAMERA".
4. Press TITLE ON/OFF button on the remote controller to display the title graphics.
5. Press PLAY button until the title you wish to record appears in the viewfinder.
6. Press Start/stop button to start the title recording.
7. Press TITLE ON/OFF button on the remote controller to remove the title graphics from the viewfinder.
The camera/recorder will now record as normal.

■ **Recording titles on another VTR while playing a tape back with the camera/recorder**

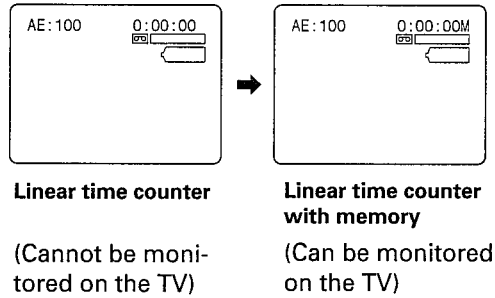
1. Connect the camera/recorder and VTR.
(See page 28.)
2. Select the title you wish to record from page 1 or page 2. The last title selected will appear first. Press TITLE ON/OFF button on the remote controller to turn title off.
3. Set the VTR in the recording mode and camera/recorder in the playback mode.
4. Press TITLE ON/OFF button on the remote controller when you see the scene where you want to record the title.
5. Press TITLE ON/OFF button on the remote controller to erase the display from the viewfinder.

■ **Chart of characters available by using the CHARACTER control**

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
S	T	U	V	W	X	Y	Z	0	1	2	3	4	5	6	7	8	9
?	'	.	/	,	-	;	:	<	>	!							

DISPLAY BUTTON

When the DISPLAY button on the remote controller is pressed, the displays in the viewfinder will change as follows.



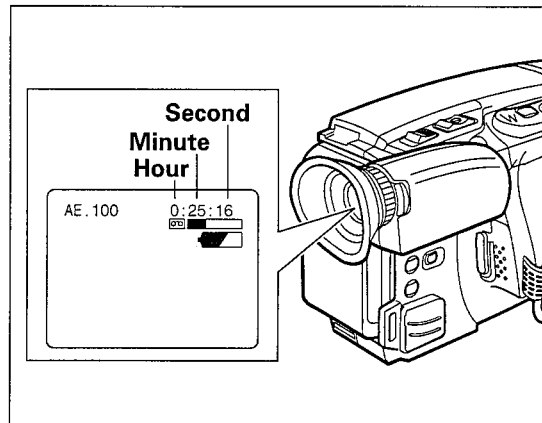
LINEAR TIME COUNTER

Shows length of tape run in hours, minutes and seconds.

When the camera/recorder is turned on, the linear time counter appears in the viewfinder.

Load a cassette into the camera/recorder and perform recording or playback; the counter indicates the elapsed time. Press the COUNTER RESET button to reset the counter to "0:00:00".

NOTE: Counter changes to "0:00:00" when cassette is ejected.

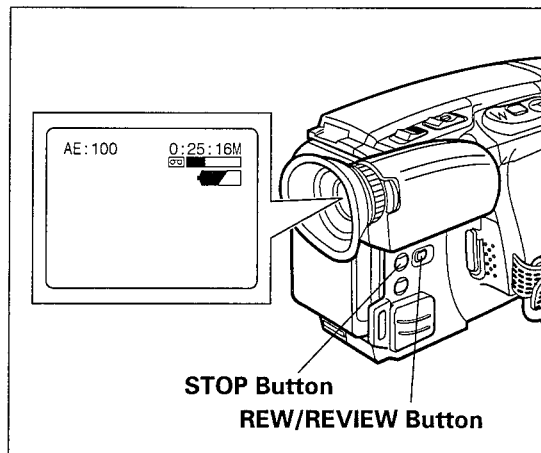


MEMORY

When the linear time counter with memory indication appears in the viewfinder, a tape that is being rewound automatically stops when the counter reads approximately "0:00:00M". This is useful if there is a section of tape you want to review immediately after recording or if you want to return to the same point several times in a row.

1. Press DISPLAY button on the remote controller until the linear time counter with memory is displayed.
2. Start playing or recording a tape.
3. At the point you want playback to start, press COUNTER RESET button on the remote controller to reset the counter to "0:00:00M".
4. Continue to play or record.
5. Press STOP button.
6. Press REW/REVIEW button. The tape will be rewound to the preselected point, at approximately "0:00:00M" indication.

NOTE: The tape will also stop approximately at "0:00:00M" during fast forward mode.

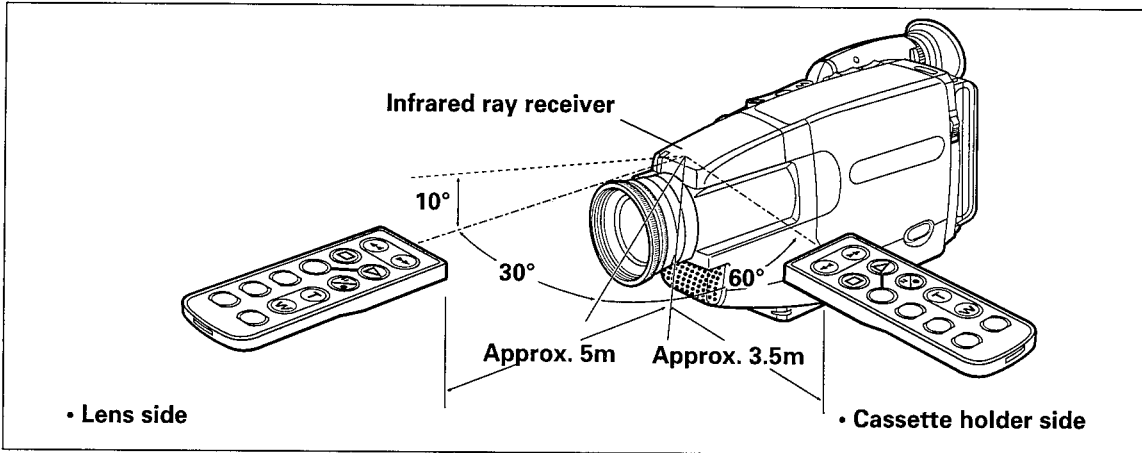


WIRELESS REMOTE CONTROLLER

You can operate the camera/recorder with the wireless remote controller (provided) from a distance. The buttons on the remote controller except for AV DUB, S.EDIT, TITLE ON/OFF, COUNTER RESET and DISPLAY buttons have the same functions as the buttons with the same identifications on the camera/recorder.

Aim the remote controller at the receiver of the camera/recorder.

■ Remote controllable range



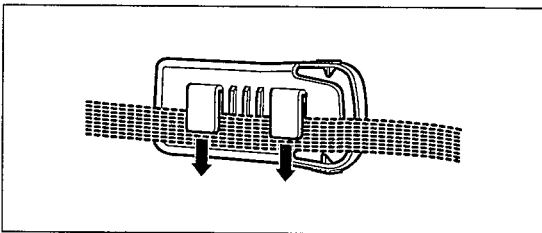
Cautions on the remote controller

- Use the remote controller indoors. When the infrared ray receiver is exposed to direct sunlight or strong light such as that from artificial lighting, the remote controller may not operate correctly.
- The remote controller cannot be operated if there is an obstacle between the remote controller and infrared ray receiver.
- The remote control code of this camera/recorder is "VTR2". If the remote control code of your VTR is the same, "VTR2", your VTR may malfunction when this remote controller is used.

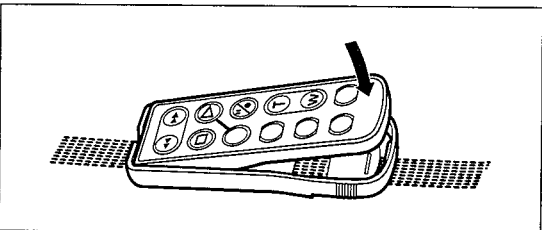
■ How to attach the remote controller to the shoulder strap

It is recommended that you fit the remote controller into the holder and attach the holder to the shoulder strap so as not to lose the remote controller and for convenience when shooting outdoors.

1. Attach the holder to the shoulder strap.

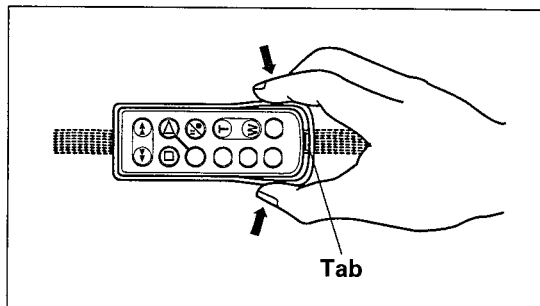


2. Attach the remote controller to the holder.
Fit the remote controller into the holder as shown in the figure below and push the controller in the direction of the arrow until a click is heard.



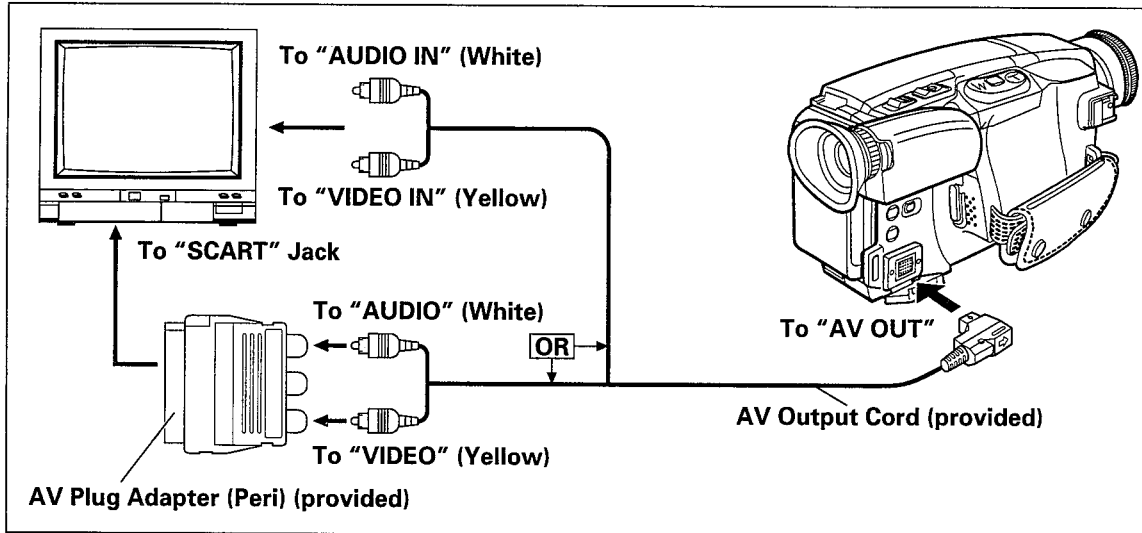
■ To remove the remote controller

Push both sides of the holder until the remote controller is released from the tab. The rear of the remote controller will be released from the holder and will lift slightly.



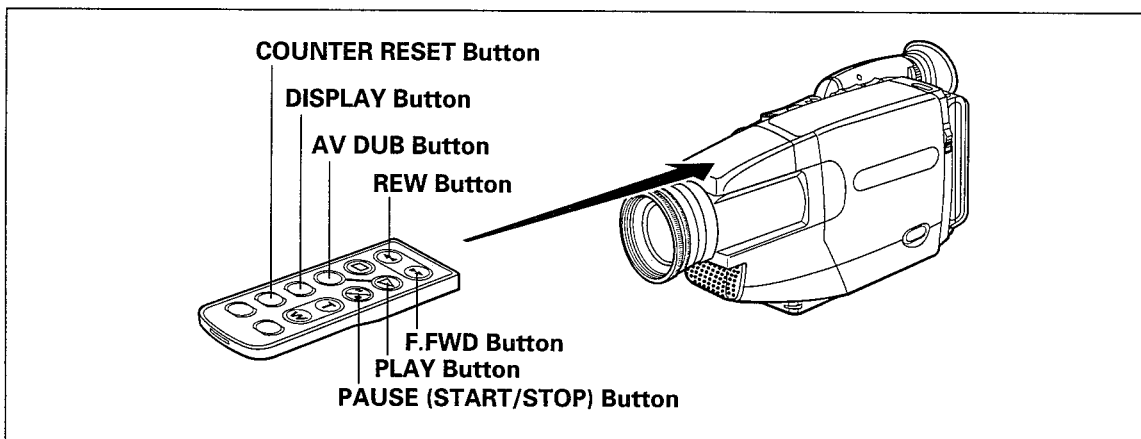
AUDIO/VIDEO DUBBING

Audio/video dubbing lets you record new audio and video from the camera/recorder's built-in microphone and camera on to the tape in the camera/recorder.



- NOTES:**
- If your TV has "AUDIO/VIDEO IN", connect the AV output cord directly to the TV.
 - If your TV has "SCART" jack, connect the AV output cord to the AV plug adapter, and then connect the adapter to the SCART jack of your TV.
 - When the audio/video dubbed portion is played back, noise may appear at the end of the dubbed portion.
 - If the camera/recorder is in AV DUB pause or STILL mode for more than 5 minutes, the camera/recorder stops automatically to protect the tape.
 - Automatic date recording is disabled during audio/video dubbing.

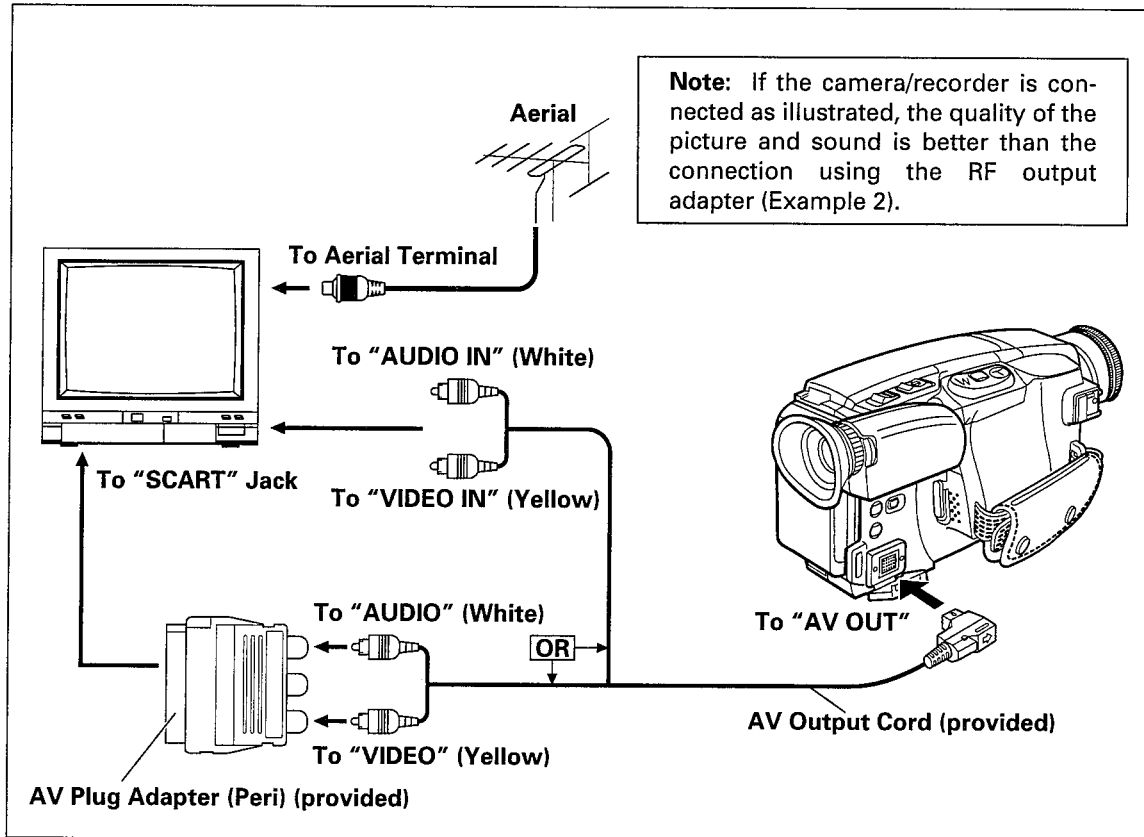
1. Insert a recorded tape.
Be sure that the record-protect tab is not closed.
2. Slide OPERATE switch to "VIDEO".
3. Aim the remote controller at the receiver on the camera/recorder.
4. Press PLAY button and then REW or F.FWD button to search to the approximate area on the tape where you want to begin your dub.
5. Press PLAY button again to search for the exact position that you want to stop dubbing and then press PAUSE (START/STOP) button.
6. Press DISPLAY button so that the linear time counter with memory appears and then press COUNTER RESET button to set the counter reading to "0:00:00M".
7. Press REW button to rewind the tape to the approximate position that you want to start dubbing.
8. Press PLAY button, and when the exact position that you start to dub is reached, press PAUSE (START/STOP) button.
9. Press and hold the AV DUB button, and then press the PLAY button. "A/V DUB II" appears in the viewfinder, and at the same time the picture to be dubbed appears.
10. Press PAUSE (START/STOP) button.
"A/V DUB" will appear in the viewfinder and A/V dubbing will start. A/V dubbing will stop when the counter reads "0:00:00M".



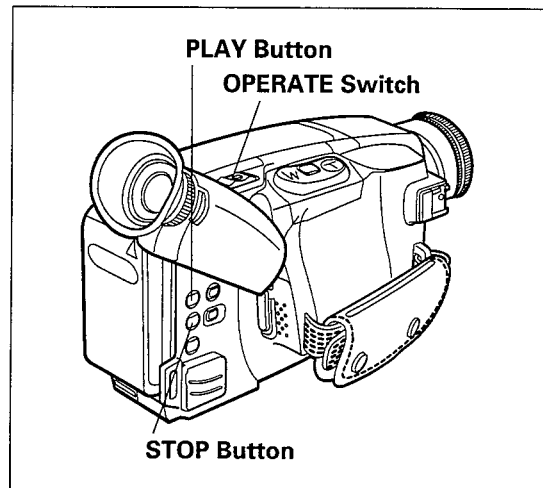
CONNECTIONS AND OPERATIONS FOR VIEWING THE PICTURE PLAYED BACK ON YOUR TV

To play back a tape recorded on your camera/recorder and view it on your TV receiver, you must connect the camera/recorder to the TV receiver using either AV output cord or RF output adapter.

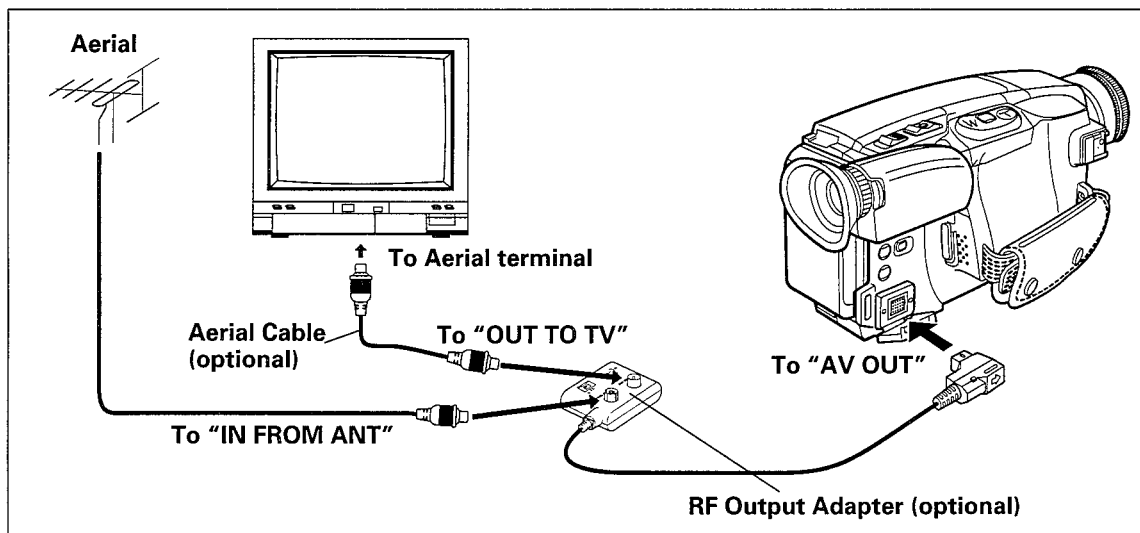
Example 1: If your TV has SCART jack or AUDIO/VIDEO IN jacks,



1. Connect the TV and camera/recorder as illustrated above.
2. Turn on TV and select video input.
3. Insert the cassette.
4. Slide OPERATE switch to "VIDEO".
5. Press PLAY button.
6. After playing press STOP button.



Example 2: If your TV is a regular TV,



1. Remove the antenna cable from your TV set. Connect this cable to "IN FROM ANT" on the RF output adapter.
2. Connect the Aerial cable to "OUT TO TV" on the RF output adapter.
3. Connect the other end to aerial terminal on your TV.
4. Connect the connector cable from RF output adapter to "AV OUT" on the camera/recorder.
5. Turn on the TV and select an unused channel (CH37). Refer to "VIDEO CHANNEL SETTING" below.
6. Perform same procedures in steps 3 through 6 of "Example 1" on page 25.

NOTE: If you want to watch a TV programme with camera/recorder connected as illustrated, slide OPERATE switch of the camera/recorder off.

VIDEO CHANNEL SETTING

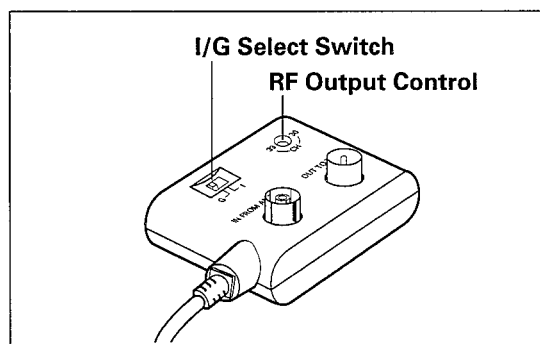
When viewing the picture played back by the camera/recorder on your TV, change over the I/G select switch of the RF output adapter matching your TV as well as to select the video channel on the TV.

1. Connect TV, RF output adapter and camera/recorder. (See above)
2. Set I/G select switch on RF output adapter as follows.

Colour TV broadcast system in your country	Position of I/G Select Switch
PAL (System I)	I
PAL (System B & G)	G

3. Turn on TV and select an unused channel (CH37). (In some cases this may be marked A/V.)
4. Insert the recorded tape to camera/recorder.
5. Slide OPERATE switch to "VIDEO".

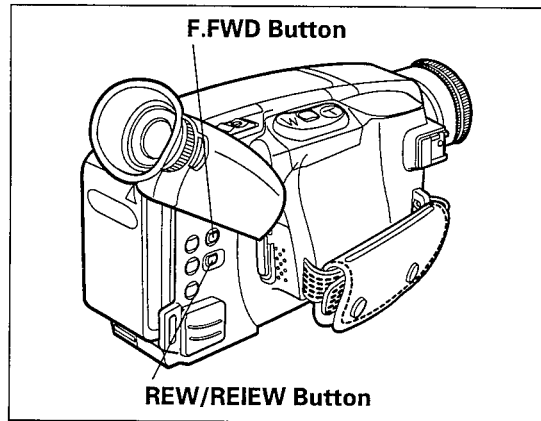
6. Press PLAY button of camera/recorder.
Now playback picture appears on your TV.
If the playback picture is not clear or channel 37 is used for broadcasting in your area, adjust the RF output control of RF output adapter using a small screwdriver and readjust your TV until the playback picture is clearly observed.



F-SEARCH AND R-SEARCH

When you press F.FWD or REW/REVIEW button during playback, the tape will be played back at a speed about 7 times (forward search) or 5 times (reverse search) faster than the normal playback speed, and you can easily locate a certain spot on the tape.

NOTE: There will be noise (interference) in the F-search or R-search pictures.

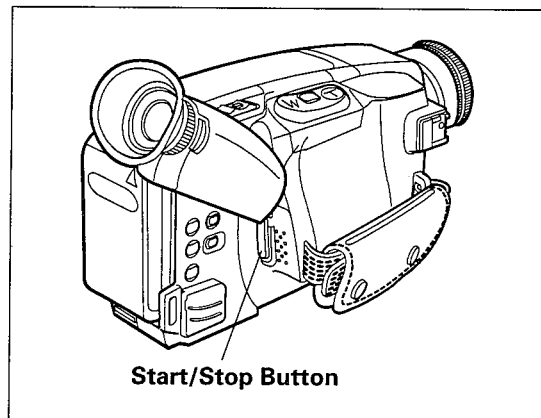
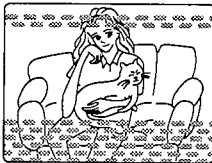


STILL

When Start/stop button is pressed during playback, a still picture can be seen. To start again press Start/stop button and playback will be resumed.

NOTES:

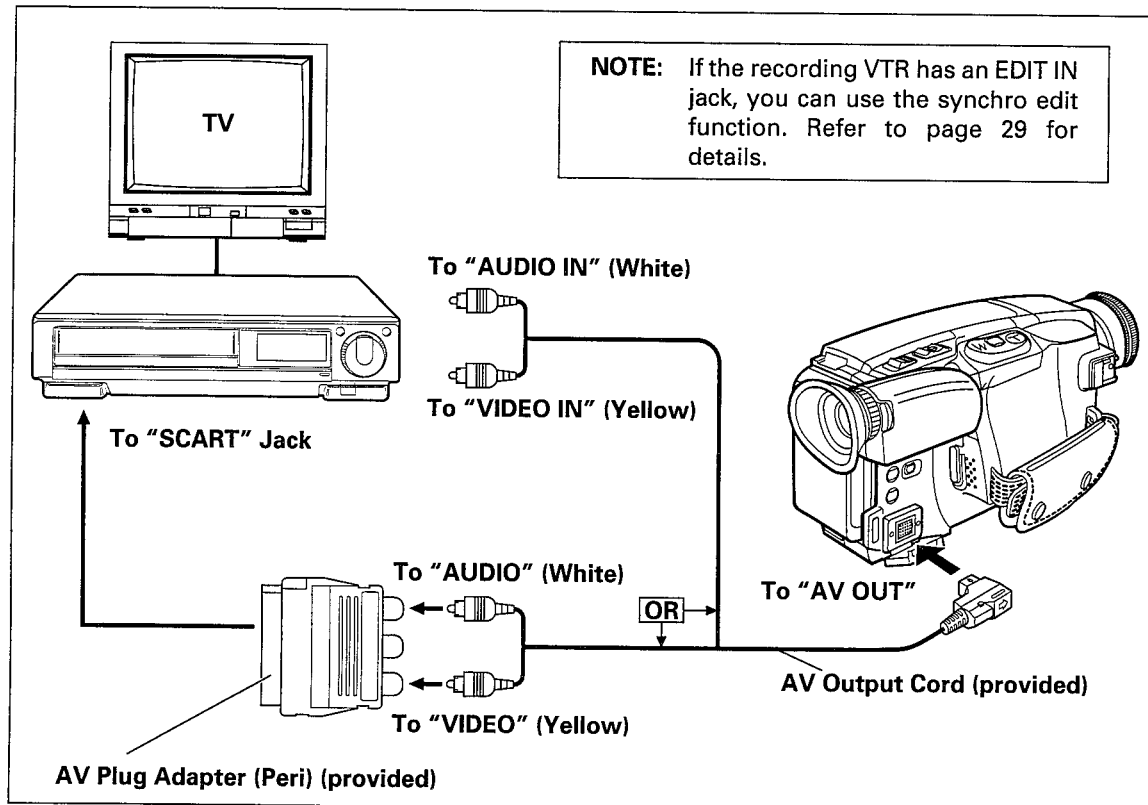
- There will be noise (interference) in the still picture.
- If the play pause mode continues for more than 5 minutes, the camera/recorder will automatically enter the stop mode to protect the tape from damage.



FLYING ERASE HEAD

A rotating erase head which eliminates glitches and rainbow noise that occurs at the joints between recordings in previous models.

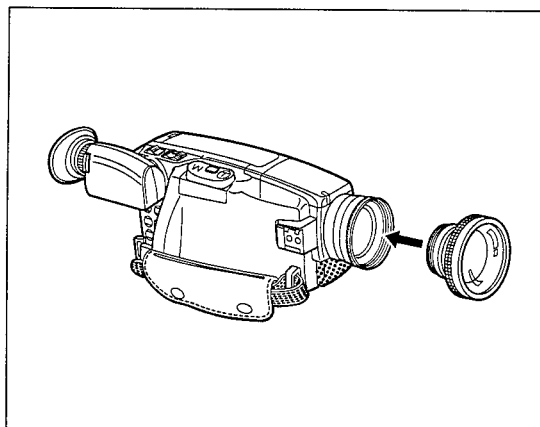
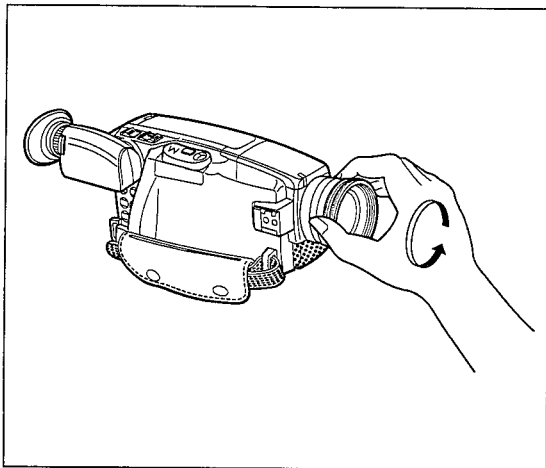
CAMERA/RECORDER TO VTR DUBBING



1. Connect the camera/recorder, VTR and TV as shown in the figure, and then turn on their operate switches.
2. Insert the cassette used for editing into the camera/recorder and the cassette to be recorded into the VTR.
3. Play the tape on camera/recorder and record it on the VTR.

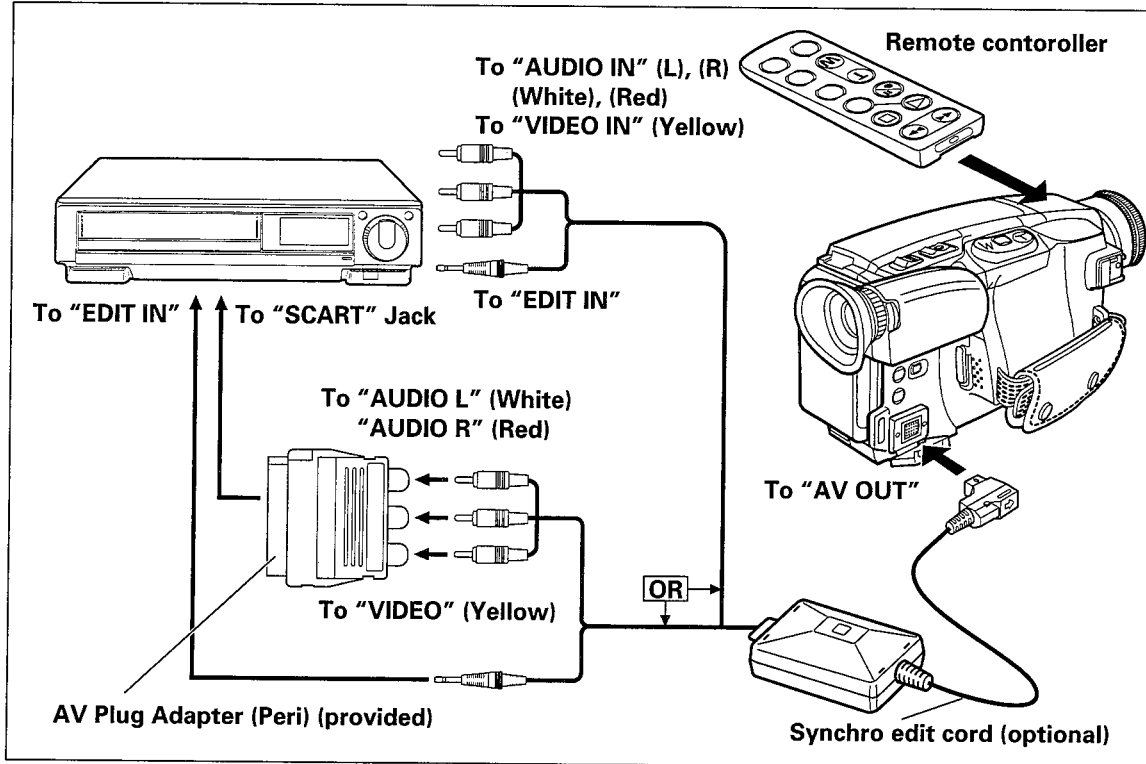
ATTACHING THE TELE OR WIDE CONVERTER

1. To remove lens hood, turn it counterclockwise.
2. Remove both caps of the tele or wide converter.
3. Screw the lens into the threads on the front of video camera/recorder lens assembly.



SYNCHRO EDIT

Synchro edit allows your camera/recorder to control a compatible VTR (one that has an EDIT IN jack) while tapes are being copied from the camera/recorder to the VTR. This is convenient when you want to record only selected segments from a previously recorded tape.



1. Connect your camera/recorder to a compatible VTR as shown above. An optional synchro edit cord is required.

NOTE: If your VTR has a single (mono) audio input, connect either the left or right audio plug to the audio input on the VTR.

2. Insert the recorded tape into the camera/recorder.
3. Insert the blank tape into the recording VTR.
4. Point the remote control at the receiver on the camera/recorder and use the remote control to operate the camera/recorder.
5. Press PLAY and then REW or F.FWD button to search to the approximate position of the tape on which you want to dub a picture.
6. Press PLAY button again to search the exact position where you stop dubbing and then press PAUSE button.
7. Press DISPLAY button so that the linear time counter with memory appears and then press COUNTER RESET button to set the counter reading to "0:00:00M".
8. Press REW button to rewind the tape to the approximate position from which you want to start dubbing.
9. Press PLAY button, and when the exact position from which you start to dub is reached, press PAUSE button.
10. Press RECORD button on the VTR. The VTR automatically enters record/pause mode.

NOTE: If the VTR begins to record instead of pausing, you will need to change the position of the switch on the synchro edit cord. Stop the VTR, change the switch, and then press RECORD button on the VTR again.

11. Pressing S.EDIT button puts the camera/recorder in the review mode for several seconds and then into the playback mode. The recording VTR starts recording and stops automatically when the counter reading of the camera/recorder reads "0:00:00M".

NOTES:

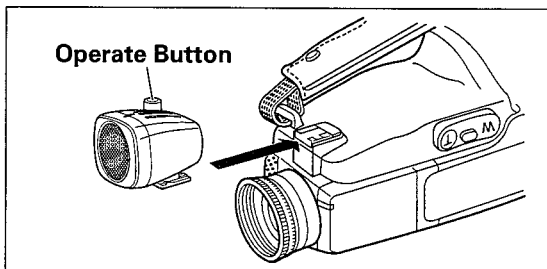
- Pressing REW, F.FWD, STOP or PAUSE button automatically put the VTR into the record/pause mode. This allows you to search (forward or backward), fast-forward or rewind the tape in the camera/recorder without disturbing the tape in the VTR.
- To search forward (or backward), press F.FWD (or REW) button. When you press PLAY button, the camera/recorder will resume normal playback. To begin copying again, press PAUSE button and then the S.EDIT button.
- To fast-forward (or rewind) the tape, press STOP then F.FWD (or REW). To begin copying again, press STOP, then PLAY, then PAUSE to pause the camera/recorder, and S.EDIT to begin copying.
- If the tape counter reads "0:00:00M" you cannot start recording.

ATTACHING THE OPTIONAL DC CAMERA LIGHT

Use the DC camera light if you wish to shoot objects in dark places.

NOTES:

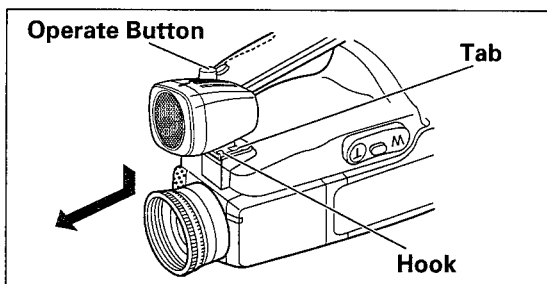
- When the DC camera light is used, the operation time of the camera/recorder becomes short even if a fully-charged battery pack is attached.
 - When the camera/recorder is turned on, a voltage is always generated at the installation terminal of the DC camera light. Never touch this terminal.
1. Make sure that a fully charged battery pack or AC adapter/charger is attached.
 2. Check that the camera/recorder is turned off.
 3. Attach the DC camera light to the camera light shoe.



4. Turn on power of the camera/recorder and then press operate button of the DC camera light when required.

NOTES:

- Turn on the camera light only when you need it. Otherwise the operation time of the battery pack becomes shorter because the power consumption of the camera light is high.
 - If the DC camera light is turned on and off during recording, there could be noise in the picture. Watch the battery charge indicator especially when using a battery as the power source.
5. To remove the camera light, depress the light to release the tab from the hook and then move the light in the direction of the arrow as shown in the figure.



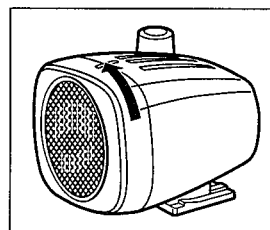
NOTES:

- The front and lamp of the DC camera light become very hot during use of the camera light or immediately after use. Be careful that your hand or hair does not touch them.
- Never touch the terminal of the DC camera light with your hand or short it using metal.

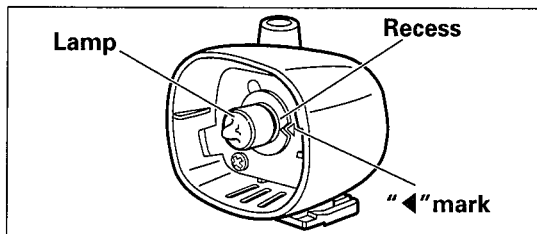
- When the camera light is on, do not allow water to drop on the light.
- When the camera light is on, avoid subjecting the camera light to impacts or sharp vibrations.
- Do not allow the cooling vents to become blocked. Also, do not cover the camera light with paper or other objects, since the air flow will be interrupted, resulting in possible overheating hazard.
- Never use the camera light in the vicinity of explosive or highly inflammable materials.
- When storing the camera light in the camera case following use, be sure to allow it sufficient time to fully cool down before placing it in the case.
- Replace only with lamp (optional accessory), to reduce the risk of fire.

To replace the lamp of the camera light

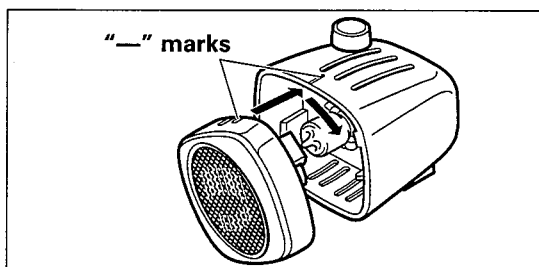
- Turn the front case in the direction of the arrow to remove it.



- To install the lamp in the camera light, align the recess of the lamp and the "◀" mark of the camera light.




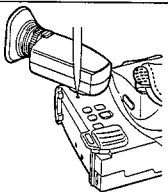
- Press the lamp through the hole of the reflective plate and re-attach the front case to the camera light by aligning the "—" marks of the front case and camera light, then turn the case in the direction of the arrow.



NOTES:

- Do not touch the lamp directly with your fingers. It may shorten its service life.
- When the lamp is replaced, or when the front case of the camera light is removed, make sure the front case is attached to the camera light properly.

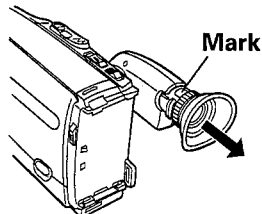
TROUBLESHOOTING

Symptom	Check Point & Correction
Cassette holder cannot be opened when you slide EJECT switch.	Connect the power source.
Cassette cannot be inserted into cassette compartment.	Load cassette in direction indicated by arrow on cassette.
	The cassette window must be towards the outside.
Picture does not appear in the viewfinder.	Remove the lens cap.
	Slide OPERATE switch to "CAMERA".
The camera/recorder cannot go into the recording mode, even when Start/stop button is pressed.	Check the record-protect tab on the cassette. See page 12 for details.
	Set OPERATE switch to "CAMERA" position.
	Push the cassette holder embossed PUSH to close it.
	The "  " indication in the electronic viewfinder flashes to indicate battery is discharged. Try another battery or charge the battery.
PLAY button cannot be engaged.	Set OPERATE switch to "VIDEO" position.
Interference on playback picture. (The TV is connected to the camera/recorder using the RF output adapter.)	When you see the playback picture on your TV, adjust fine tuning knob on television set to obtain the best picture.
Picture is out of focus. Auto-focus does not operate correctly.	Auto-Focus does not operate correctly if a special-effects filter is attached or with the objects shown on page 15.
Power is interrupted.	If the record pause mode continues for more than 5 minutes, power is shut off automatically. Press the Start/stop button to restore the power.
Power is not turned on and no button operations are accepted.	Remove the power source, and after about one minute, push the reset switch gently using a toothpick, etc. until you feel a click. The display will be reset. Then set the information again. 
TAPE appears in the viewfinder.	Have you moved the camera/recorder or cassette from a cold place to a warm place so that its temperature changed abruptly? If the temperature has changed, remove the cassette and set the OPERATE switch to OFF, then wait for about one hour.
	Remove the cassette and then try to reinsert: remove it several times. If the indication is still shown in the viewfinder, use a cleaning tape to clean the heads and replace the cassette.

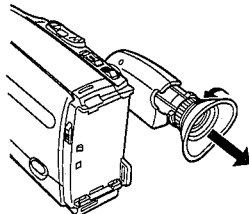
■ CLEANING THE INSIDE OF THE ELECTRONIC VIEWFINDER

If dust or foreign matter adheres inside the viewfinder, clean it by using the following procedure.

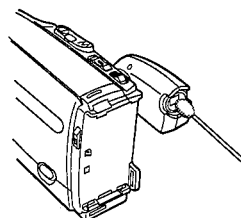
1. Pull out the eye cup to the position where a mark can be seen (up to a half where it is pulled out all the way). The side with the mark should be up.



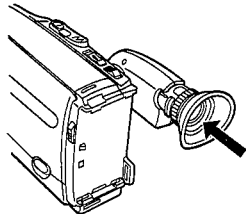
2. Turn the eye cup counterclockwise until it stops, then pull it out to remove.



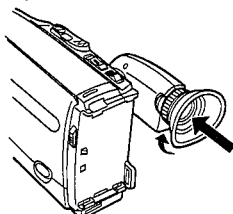
3. Clean the picture tube face and lens. To prevent scratching, use a soft non abrasive cloth, swab or lens cleaning paper.



4. Face the rib up as shown below and push the eye cup in until it stops.



5. Turn the eye cup clockwise until it stops, then push it in all the way.



SPECIFICATIONS

■ General

Power requirements	6V DC
Power consumption	5.1 watts (when recording)
Operating temperature	0°C to 40°C
Operating humidity	< 80%
Storage temperature	-20°C to 50°C
Dimensions	91(W) x 116(H) x 214(D) mm
Weight	Approx. 740g (without battery pack, lens hood, lens cap and cassette)

■ Video Recorder Section

Format	8 mm
Record/playback system	Two video record/playback heads
Video signal	PAL colour & CCIR monochrome signals 625 lines
Tape speed	SP: 20.05 mm/sec.
Video output	1.0 Vp-p, 75 ohm
Audio output	-8 dBs, less than 1K ohm
Fast forward/rewind time	Less than 8 minutes with P5-90 cassette

■ Camera Section

Scanning	625 lines/50 fields/25 frames
Required minimum illumination	2 lux
Camera device	1/3" C.C.D
Lens diameter	46 mm

MAINTENANCE

1. To maintain the optimum performance of this camera/recorder, regular periodic maintenance is required. Your dealer will advise you further.
2. Maintenance and adjustments may not be carried out by the user. In all cases of difficulty or doubt, consult your dealer.

3. Head cleaning

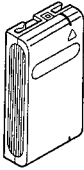
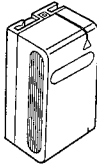
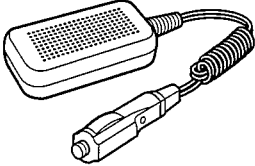
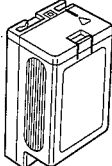
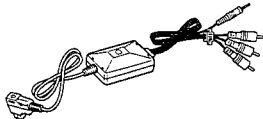
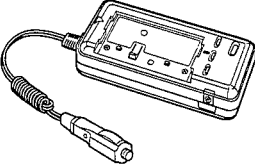
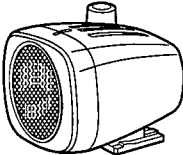
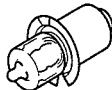
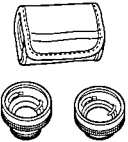
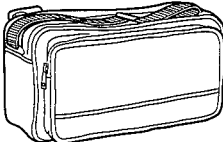
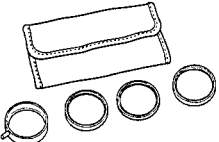
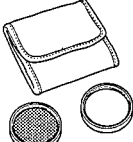
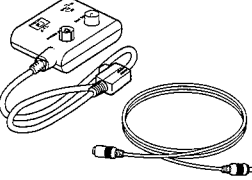
Dirt accumulated on the video heads after a period of time may cause the playback picture to become blurred or part of the video information to be lost. This does not mean that the recorded programme has been erased but head cleaning is required.

Use the Maxell 8M-CLT or similar dry type head cleaning tape to clean the video heads.

When it is difficult to remove a dirt using the head cleaning tape, head cleaning requiring highly technical care is necessary.

Consult your nearest dealer or VTR service center for head cleaning.

OPTIONAL ACCESSORIES

Battery Pack (for standard play) VM-BP82G	Battery Pack (for long play) VM-BP83	Car Battery Cord VM-CC80E	Alkaline Battery Housing VM-BP86C
			
Synchro Edit Cord VM-CH95	Car Adapter Charger VM-CA80E	DC Camera Light VM-CP4	Lamp for Camera Light VM-CP4L
			
Conversion Lens Set VM-CL12TW	Soft Case VM-CB55SR	Filter Kit VM-FL60K	Filter Kit VM-FL46K
			
RF Output Adapter VM-RF85E			
			

HITACHI

Hitachi, Ltd. Tokyo, Japan
International Sales Division
THE HITACHI ATAGO BUILDING,
No. 15-12 Nishi Shinbashi, 2-Chome,
Minato-Ku, Tokyo 105-8430, Japan.
Tel: 03 35022111

HITACHI EUROPE LTD.

Dukes Meadow
Millboard Road
Bourne End
Buckinghamshire
SL8 5XF

UNITED KINGDOM

Tel: 01628 643000

Fax: 01628 643400

Email: consumer-service@hitachi-eu.com

HITACHI EUROPE S.A.

364, Kifissias Ave. & 1, Delfon Str.
152 33 Chalandri

Athens

GREECE

Tel: 1-6837200

Fax: 1-6835694

Email: service.hellas@hitachi-eu.com

HITACHI EUROPE GmbH

Munich Office
Dornacher Strasse 3
D-85622 Feldkirchen bei München

GERMANY

Tel: +49 -89-991 80-0

Fax: +49 - 89 - 991 80 -224

Hotline: +49 - 180 - 551 25 51 (12ct/min.)

Email: HSE-DUS.Service@Hitachi-eu.com

HITACHI EUROPE S.A.

Gran Via Carlos III, 101 - 1
08028 Barcelona

SPAIN

Tel: 93 409 2550

Fax: 93 491 3513

Email: rplan@hitachi-eu.com

HITACHI EUROPE SRL

Via T. Gulli n.39
20147 MILAN

ITALY

Tel: 02 487861

Fax: 02 48786381

Servizio Clienti

Tel. 02 38073415

Email: customerservice.italy@hitachi-eu.com

HITACHI EUROPE AB

Box 77

S-164 94 KISTA

SWEDEN

Tel: 08 562 711 00

Fax: 08 562 711 11

Email: csgrswe@hitachi-eu.com

HITACHI EUROPE S.A.S

Lyon Office
B.P. 45, 69671 Bron Cedex

FRANCE

Tel: 04 72 14 29 70

Fax: 04 72 14 29 99

Email: france.consommateur@hitachi-eu.com

HITACHI EUROPE LTD.

Norwegian Branch Office
Strandveien 18
1366 Dysaker

NORWAY

Tel: 02205 9060

Fax: 02205 9061

Email: csgrnor@hitachi-eu.com

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UCO Tower – Bellevue, 17
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BELGIUM (for BENELUX)

Tel: 09 230 48 01

Fax: 09 230 96 80

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www.hitachi-consumer-eu.com